



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4
ATLANTA FEDERAL CENTER
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ATLANTA, GEORGIA 30303-8960

MAR 27 2008

Mr. Jim H. Fyke
Commissioner
Tennessee Department of Environment
and Conservation
401 Church Street
21st Floor, L&C Tower
Nashville, Tennessee 37243-0435

Dear Mr. Fyke:

The Environmental Protection Agency (EPA) has received and considered Tennessee's revisions to the General Water Quality Criteria and Use Classifications for Surface Waters rules adopted by the Tennessee Water Quality Control Board on October 24, 2006, and submitted to EPA by letter dated July 20, 2007. These new and revised water quality standards were adopted by Tennessee as a result of the triennial review of their standards. The submittal to EPA was accompanied by a certification from the State Attorney General that the revisions were duly adopted pursuant to state law.

The revisions to Tennessee's General Water Quality Criteria and Use Classifications for Surface Waters regulations include: editorial changes to clarify existing provisions and current practices; new and revised definitions; revisions to the procedures for site-specific criteria studies and exclusion areas for mixing zones; revised numeric water quality criteria consistent with EPA's Clean Water Act (CWA) section 304(a) criteria guidance; new and revised narrative criteria for total suspended solids, iron, biological integrity, habitat, temperature, and flow; a new chlorophyll *a* criterion for Pickwick Lake; instream design flow values used in the application of specific water quality criteria; an implementation methodology for the state's antidegradation policy; and new and revised use classifications within several river basins. These revisions were compared to the requirements of CWA Section 303 and 40 CFR Part 131.

The revision to 1200-4-3-.03(4)(1) was determined not to be a water quality standard subject to EPA review under section 303(c). With the exception of this specific revision, EPA has determined that the revisions to Tennessee's General Water Quality Criteria and Use Classifications for Surface Waters adopted by the state on October 24, 2006, comply with the requirements of CWA Section 303 and 40 CFR Part 131, and therefore are approved. A summary of EPA's review of these new and revised water quality standards, "United States Environmental Protection Agency Determination Under Section 303(c) of the Clean Water Act Review of Chapters 1200-4-3 and 1200-4-4 General Water Quality Criteria and Use Classifications for Surface Waters," is enclosed.

EPA also notes that Tennessee has deleted certain subcoregion-specific DO and pH values in its 2007 submittal. However, because EPA deferred action on these provisions in 2004,

the statewide DO criterion of 5.0 mg/l and pH criterion of 6.0 standard units, which was previously adopted by Tennessee and approved by EPA, remain the applicable criteria for CWA purposes in those cases. Accordingly, there are no revisions to the currently applicable criteria in those cases requiring EPA action and this concludes the review of those provisions.

As part of EPA's review of 1200-4-3-.02(9), EPA suggests the following, based on language contained in EPA's Water Quality Standards Handbook: Second Edition (1994). After adoption of the Water Effects Ratio procedure, public review of a site-specific criterion should be accomplished in conjunction with the public review required for permit issuance. For public information, EPA recommends that once a year Tennessee publish a list of site-specific criteria and post the list on the Tennessee Department of Environment and Conservation internet site.

EPA's decision to approve the new and revised portions of Tennessee's water quality standards as referenced above is subject to the results of consultation under Section 7 of the Endangered Species Act with the U.S. Fish and Wildlife Service. By approving the standards "subject to the results of consultation," EPA retains its discretion to take appropriate action if the consultation identifies deficiencies in the standards requiring remedial action by EPA. EPA will notify Tennessee of the results of the Section 7 consultation upon completion of the action.

We would like to commend you and your staff for your continued efforts to protect and enhance Tennessee's waters during this triennial review. If you have questions regarding EPA's actions, please contact me at (404) 562-9345 or have a member of your staff contact Lauren Petter at (404) 562-9272.

Sincerely,

A handwritten signature in black ink, appearing to read "J. Giattina", with a stylized flourish extending from the end.

James D. Giattina
Director
Water Management Division

Enclosure

cc: Paul E. Davis, TDEC

United States Environmental Protection Agency Determination
Under Section 303(c) of the Clean Water Act
Review of Chapters 1200-4-3 and 1200-4-4
General Water Quality Criteria and Use Classifications for Surface Waters

This document summarizes our review of the revisions to the General Water Quality Criteria and Use Classifications for Surface Waters adopted by the Tennessee Water Quality Control Board (WQCB) on October 24, 2006. These revisions were adopted as a result of Tennessee's triennial review of water quality standards, as required by section 303(c) of the Clean Water Act (CWA). EPA received the water quality standards revisions on July 23, 2007, which were submitted by letter dated July 20, 2007. The submittal to the Environmental Protection Agency (EPA) was accompanied by certification from the State Attorney General stating that the water quality standards revisions "are approved as to legality pursuant to the provisions of the Administrative Procedures Act, Tennessee Code Annotated, Title 4, Chapter 5."

Following a March 2005 vote by the WQCB to initiate rulemaking hearings, Tennessee Department of Environment and Conservation (TDEC) posted a copy of the proposed revisions to water quality standards on their internet site. A notice was also filed with the Secretary of the State's office in addition to legal notices published in newspapers and more general public notices. A series of public hearings was held by the Division of Water Pollution Control (DWPC). Copies of comments received during the public comment period, and the WQCB's responses, were provided to EPA.

The Division of Water Pollution Control has submitted revisions for the following subchapters of its General Water Quality Criteria and Use Classifications for Surface Waters regulations:

- A. Changes within 1200-4-3-.02 General Considerations
- B. Changes within 1200-4-3-.03 Criteria For Water Uses
- C. Changes within 1200-4-3-.04 Definitions
- D. Changes within 1200-4-3-.05 Interpretation of Criteria
- E. Changes within 1200-4-3-.06 Tennessee Antidegradation Statement
- F. Changes within 1200-4-4 Use Classifications for Surface Waters
- G. General Changes within 1200-4-3 General Water Quality Criteria

This document specifically includes review of the revisions adopted October 24, 2006, with the exception of the revision detailed in item 20 of this document, the revision to 1200-4-3-.03(4)(l), which was determined not to be a water quality standard subject to EPA review under section 303(c).

Additions to the State's water quality standards regulations are shown underlined below, while deletions to the regulations are shown stricken. The conclusions of our review with respect to the additions and deletions are as follows:

A. Changes within 1200-4-3-.02 General Considerations

1. 1200-4-3-.02(3) and 1200-4-3-.02(5) were revised to state:

1200-4-3-.02(3)

The rigid application of uniform water quality is not desirable or reasonable because of the varying uses of such waters. The assimilative capacity of a stream for sewage and waste varies depending upon various factors and including the following: volume of flow, depth of channel, the presence of falls or rapids, rate of flow, temperature, natural characteristics, and the nature of the stream. ~~Also, the relative importance assigned to each use will differ for different waters and sections of waters.~~

1200-4-3-.02(5)

Since all Waters of the State are classified for more than one use, the most stringent criteria will be applicable. In cases where criteria for protection of more than one use apply at different stream flows (e.g., aquatic life versus recreation), the most protective ~~stringent criteria~~ will also be applicable.

The replacement of the deleted language above clarifies the intent of the state that where multiple designated uses and their respective criteria apply it is the most protective criterion that will be used. This ensures that the appropriate criterion is used. This is consistent with 40 CFR § 131.11.

2. 1200-4-3-.02(6) was revised to state:

Waters identified as wet weather conveyances according to the definition found in 1200-4-3-.04(4), shall be protective of humans and wildlife that may come in contact with them and shall not ~~degrade or~~ adversely affect the quality of downstream waters. Applicable water quality standards will be maintained downstream of wet weather conveyances.

The meaning of degrade has certain connotations in Tennessee's water quality regulations. The new and revised definitions within section 1200-4-3-.04 provide certain meanings for degradation and de minimis degradation. By providing that downstream waters shall not be "adversely affect[ed]," the concept of degradation to waters is handled outside of this provision and in accordance with the antidegradation procedures found at 1200-4-3-.06. This revision is consistent with 40 CFR Part 131.

3. 1200-4-3-.02(9) was revised to state:

(9) Site-specific criteria studies may be conducted on any appropriate fish and aquatic life criteria.

a. Site-specific criteria studies based on a Water Effects Ratio (WER) calculated from the documented toxicity of a parameter in the stream in which it will be introduced may ~~When the Division develops or approves site specific criteria for any substances for which generally applicable criteria have been adopted, the site specific criteria will~~ supersede the adopted criteria at ~~that location~~ a site. The Division shall ~~can~~ approve a

site-specific criteria developed by others provided that ~~an approved the WER~~ methodology [Interim Guidance on Determination and Use of Water-effect Ratios for Metals (EPA-823-B-94-001)] is used, ~~and that~~ both the study plan and results are approved by the department, and the U.S. Environmental Protection Agency has concurred with the final site specific criterion value(s).

b. Any site specific criterion based on methodologies other than the WER methodology which recalculate specific criterion, such as the Resident Species Method or the Recalculation Method, must be adopted as a revision to Tennessee water quality standards into Chapter 1200-4-3, and following EPA approval, can be used for Clean Water Act purposes.

References on this subject include ...Interim Guidance on Determination and Use of Water-effect Ratios for Metals (EPA-823-B-94-001).

The revisions to this section are consistent with 40 CFR 131.11(b)(1)(ii) which allows for development of site-specific criteria, provided that the site-specific criteria are based on sound scientific rationale in order to protect the designated use. The WQS Handbook (1994) provides further guidance on the application of these methods for calculating site-specific criteria. Page 3-38 (Section 3.7) of The WQS Handbook (Handbook) states, "Site-specific criteria are allowed by regulation and are subject to EPA review and approval ... [and] that EPA will approve site-specific criteria developed using appropriate procedures."

Specifically, page 3-43 (Section 3.7.5) of the Handbook provides two options by which a 303(c) review of Water Effect Ratios (WERs) can be accomplished. Tennessee has chosen Option 2 in which the state can amend its water quality standards to provide a formal WER procedure. The Handbook also emphasizes that "it is the State in all cases that determines if derivation of a site-specific criterion based on the water-effect ratio is allowed and it is the State that ensures that the calculation and data analysis are done completely and correctly." Tennessee has revised their language to be consistent with the guidance provided in the Handbook.

Tennessee has also elaborated on the requirements of the Resident Species and Recalculation Methods. However, because the end result is a site-specific criterion, which differs from the national recommendations, Tennessee has highlighted that State adoption followed by EPA review and approval is necessary before becoming effective for CWA purposes. In the "Summary of Public Comments and Tennessee Water Quality Control Board (WQCB) Responses" (State's Response to Public Comments) submitted as an enclosure to the letter dated July 20, 2007, from Paul E. Davis, Director, Tennessee Division of Water Pollution Control, to James D. Giattina, Director, EPA Region 4 Water Management Division, Tennessee provides confirmation of the State's intended difference between paragraphs a and b.

Comment E-11. 1200-4-3-.09(b) should be deleted as it appears to be a commentary.

Response: Paragraph b relates important information. The results of Water Effect Ratio studies can be incorporated into permits without a rule change. Other site-specific criteria study methods cannot.

In the letter to Mr. James H. (Jim) Fyke, Commissioner of TDEC regarding CWA section 303(c) action on this provision, EPA is suggesting the following, based on an excerpt from the Handbook and our agreements with other Region 4 states which have similar site specific criteria authorities. "After adoption of the [WER] procedure, public review of a site-specific criterion should be accomplished in conjunction with the public review required for permit issuance. For public information, EPA recommends that once a year the State publish a list of site-specific criteria and post the list on the TDEC internet site." However, at a minimum, EPA will continue having oversight of the implementation of WERs under the permit review process. Tennessee currently submits a subset of permits, as required by the Memorandum of Agreement with Region 4, for review. However, all NPDES permits utilizing the WER option could be submitted to EPA for review.

Tennessee's revisions to 1200-4-3-.02(9) are consistent with 40 CFR § 131.11.

B. Changes within 1200-4-3-.03 Criteria for Water Uses

4. 1200-4-3-.03(3)(a) was revised to state:

Dissolved Oxygen - The dissolved oxygen shall not be less than 5.0 mg/l with the following exceptions.

1. In streams identified as trout streams, including tailwaters, dissolved oxygen shall not be less than 6.0 mg/L.

2. The dissolved oxygen concentration of trout waters designated as supporting a naturally reproducing population shall not be less than 8.0 mg/L. (Tributaries to trout streams or naturally reproducing trout streams should be considered to be trout streams or naturally reproducing trout streams, unless demonstrated otherwise. Additionally, all streams within the Great Smoky Mountains National Park should be considered naturally reproducing trout streams.)

3. In wadeable streams in subecoregion 73a ~~and subecoregion 74i~~, dissolved oxygen levels shall not be less than a daily average of 5.0 mg/L with a minimum dissolved oxygen level of 4.0 mg/L.

4. The dissolved oxygen level of streams in ecoregion 66 (Blue Ridge Mountains) not designated as naturally reproducing trout streams shall not be less than 7.0 mg/L. Substantial and/or frequent variations in dissolved oxygen levels, including diurnal fluctuations, are undesirable if caused by man-induced conditions. Diurnal fluctuations shall not be substantially different than the fluctuations noted in reference streams in that region.

In lakes and reservoirs, the dissolved oxygen concentrations shall be measured at mid-depth in waters having a total depth of ten feet or less, and at a depth of five feet in waters having a total depth of greater than ten feet and shall not be less than 5.0 mg/L.

At the time of agency action on Tennessee's water quality standards revisions on September 30, 2004, EPA chose to defer action on the then revised DO criterion of "not less than a daily average of 5.0 mg/l with a minimum dissolved oxygen level of 4.0 mg/l" for subcoregion 71i. During the most recent triennial review, Tennessee reevaluated this portion of the DO criterion section for the Fish and Aquatic Life use and deleted the 2004 DO criterion of "not less than a daily average of 5.0 mg/l with a minimum dissolved oxygen level of 4.0 mg/l" for subcoregion 71i after the State determined that 5.0 mg/L, the DO criterion value that EPA Region 4 had previously reviewed and approved on September 30, 2004, and the applicable DO criterion for subcoregion 71i for CWA purposes, was, in fact, the appropriate criterion for subcoregion 71i. Because EPA did not act on the September 30, 2004 revisions to the DO criterion for subcoregion 71i, the DO criterion currently effective for CWA purposes is the statewide value of 5.0 mg/L adopted by Tennessee on September 23, 2003 and approved by EPA on September 30, 2004. Because the current criterion is identical to the criterion previously reviewed and approved by EPA, there is no new or revised DO criterion for subcoregion 71i before the Agency requiring EPA action. EPA notes for the sake of clarity that the DO criterion of 5.0 mg/L previously adopted by the State and approved by EPA on September 30, 2004 remains the applicable DO criterion for subcoregion 71i effective for CWA purposes.

The inclusion of language regarding diurnal fluctuations further clarifies the previously adopted provision, and provides detail on appropriate methods for interpreting this narrative statement. This is consistent with 40 CFR § 131.11, which allows for establishment of State criteria, particularly narrative criteria to supplement numerical criteria, and 40 CFR § 131.13, which authorizes States the discretion to include general policies in their standards.

5. 1200-4-3-.03(3)(b) was revised to state:

pH - The pH value shall not fluctuate more than 1.0 unit over a period of 24 hours and shall not be outside the following ranges: 6.0 – 9.0 in wadeable streams and 6.5 – 9.0 in larger rivers, lakes, reservoirs, and wetlands.

Subcoregion	Stream Order	pH Range
68a	1-3	5.5-8.0
68a	4+	6.0-9.0
65j	1-2	5.5-8.5
65j	3+	6.0-9.0
74b	All	5.5-8.5
All other wadeable streams		6.0-9.0
All other waters (larger rivers, reservoirs, wetlands)		6.5-9.0

Tennessee revised the pH criteria to reflect which criteria range applies to "lakes." Lakes were not specifically mentioned under the category of "All other waters" in the previously adopted language. This clarifies which waterbodies are intended to be addressed by the two different pH ranges.

At the time of agency action on Tennessee's water quality revisions on September 30, 2004, EPA chose to defer action on the then revised pH criterion lower bound of 5.5 standard units for subcoregions 65j (stream orders 1-2), 68a (stream orders 1-3), and 74b (all stream

orders). During the most recent triennial review, Tennessee reevaluated this portion of the pH criterion for the Fish and Aquatic Life use and deleted the 2004 pH criteria defined by ecoregions after the State determined that 6.0 standard units, the pH criterion value that EPA Region 4 had previously reviewed and approved on September 30, 2004, and the applicable pH criterion for Wadeable Streams for CWA purposes, was, in fact, the appropriate criterion for all Wadeable Streams in the state. Because EPA did not act on the September 30, 2004 revisions to the pH criteria for subcoregions 65j (stream orders 1-2), 68a (stream orders 1-3), and 74b (all stream orders), the Wadeable Streams pH criterion currently effective for CWA purposes is the statewide range of 6.0-9.0 standard units adopted by Tennessee on September 23, 2003 and approved by EPA on September 30, 2004. Because the current criterion is identical to the criterion previously reviewed and approved by EPA, there are no new or revised pH criteria for subcoregions 65j (stream orders 1-2), 68a (stream orders 1-3), and 74b (all stream orders) before the Agency requiring EPA action. EPA notes for the sake of clarity that the pH criterion range of 6.0-9.0 standard units previously adopted by the State and approved by EPA on September 30, 2004 remains the applicable pH criterion for all Wadeable Streams effective for CWA purposes, which includes subcoregions 65j (stream orders 1-2), 68a (stream orders 1-3), and 74b (all stream orders).

6. 1200-4-3-.03(3)(d) was revised to state:

Turbidity, Total Suspended Solids, or Color - There shall be no turbidity, total suspended solids, or color in such amounts or of such character that will materially affect fish and aquatic life. In Wadeable Streams, suspended solid levels over time should not be substantially different than conditions found in reference streams.

The inclusion of language regarding total suspended solids further refines the protection provided by this narrative criterion provision. The addition of this language provides a specific parameter for protection of Tennessee waters. It also provides detail on an appropriate way to interpret the magnitude component of this narrative statement. With this specific detail in the water quality standards, the state can provide for more accurate assessment and corrective actions where needed to ensure protection of the designated uses. This is consistent with 40 CFR § 131.11.

7. 1200-4-3-.03(3)(e) was revised to state:

Temperature - The maximum water temperature change shall not exceed 3C° relative to an upstream control point. The temperature of the water shall not exceed 30.5°C and the maximum rate of change shall not exceed 2C° per hour. The temperature of recognized trout waters shall not exceed 20°C. There shall be no abnormal temperature changes that may affect aquatic life unless caused by natural conditions. The temperature in flowing streams shall be measured at mid-depth.

The temperature of impoundments where stratification occurs will be measured at mid-depth in the epilimnion (see definition in 1200-4-3-.04) for warm water fisheries and mid-depth in the hypolimnion (see definition in 1200-4-3-.04) for cold water fisheries. In the case of large impoundments (100 acres or larger) subject to stratification and

recognized as trout waters, the temperature of the hypolimnion shall not exceed 20°C. ~~The temperature in flowing streams shall be measured at mid-depth.~~

A successful demonstration as determined by the state conducted for thermal discharge limitations under Section 316(a) of the Clean Water Act, (33 U.S.C. §1326), shall constitute compliance with this section.

The actual language tied to the references for epilimnion and hypolimnion definitions are discussed in detail in the definitions section of this document.

The addition of the last sentence clarifies the expectations of the State and the applicant with regards to thermal discharges consistent with section 316 of the CWA. Similar language was also adopted within 1200-4-3-.06 (Tennessee's Antidegradation Statement) and that particular revision has been discussed in more detail as part of item #30 within this document. The following excerpt, from the State's Response to Public Comments, provides the rationale for the inclusion of language specific to section 316 of the CWA within 1200-4-3-.03(3)(e).

Comment G-8. The temperature criteria in 1200-4-3-.03(3)(e) should include a statement that temperature discharge permits properly issued under Section 316(a) of the Clean Water Act comply with Tennessee's water quality standards.

Response: We agree and will add this language.

Section 316 of the CWA requires that "...any effluent limitation proposed for the control of the thermal component of any discharge...will require effluent limitations more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in an on the body of water into which the discharge is to be made..." The revised language above, specifically adopted within 1200-4-3-.03 (Criteria for Water Uses) of Tennessee's water quality standards regulations, and similar to the language adopted within 1200-4-3-.06, ensures protection of the designated uses and is consistent with 40 CFR § 131.11 and 40 CFR § 131.12.

8. 1200-4-3-.03(3)(g) was revised to incorporate different numeric values into the criteria table, update the information presented in the footnotes, and update variables associated with the hardness equations. The revisions are summarized in Attachment A. In addition to the changes made within 1200-4-3-.03(3)(g), Tennessee removed 1200-4-3-.05(9) from its regulations. That provision stated, "The criteria shall be applied using the total recoverable method, unless otherwise specified, or the Division conducts or approves a chemical speciation study which determines the bioavailable or toxic fraction of a specific chemical."

The revised criteria and their respective notations reflect the updated scientific information and EPA's CWA section 304(a) recommended guidance values contained in EPA's 2006 National Recommended 304(a) Water Quality Criteria. With regard to the deleted provision from section 1200-4-3-.05, the language was no longer necessary since EPA's current section 304(a) guidance values are expressed as dissolved.

9. 1200-4-3-.03(3)(i) was revised to state:

Iron- The waters shall not contain iron at concentrations that cause toxicity or in such amounts that interfere with habitat due to precipitation or bacteria growth.

The inclusion of this new narrative criterion language further refines Tennessee's ability to provide protection to the State's waters. The addition of this language provides a specific parameter for protection of Tennessee waters. With this specific narrative in the water quality standards, the state can provide for more accurate assessment and corrective actions where needed to ensure protection of the designated uses. This provision is consistent with the CWA and 40 CFR § 131.11.

10. 1200-4-3-.03(3)(j) was revised to state:

Ammonia – The one-hour average concentration of total ammonia nitrogen (in mg N/L) shall not exceed the CMC (acute criterion) calculated using the following equations:

Where salmonid fish are present:

$$CMC = \frac{0.275}{1 + 10^{7.204 - pH}} + \frac{39.0}{1 + 10^{pH - 7.204}}$$

Or where salmonid fish are not present:

$$CMC = \frac{0.411}{1 + 10^{7.204 - pH}} + \frac{58.4}{1 + 10^{pH - 7.204}}$$

The thirty-day average concentration of total ammonia nitrogen (in mg N/L) shall not exceed the CCC (chronic criterion) calculated using the following equations:

When fish early life stages are present:

$$CCC = \left(\frac{0.0577}{1 + 10^{7.688 - pH}} + \frac{2.487}{1 + 10^{pH - 7.688}} \right) \cdot \text{MIN} (2.85, 1.45 \cdot 10^{0.028 \cdot (25 - T)})$$

When fish early life stages are absent:

$$CCC = \left(\frac{0.0577}{1 + 10^{7.688 - pH}} + \frac{2.487}{1 + 10^{pH - 7.688}} \right) \cdot 1.45 \cdot 10^{0.028 \cdot (25 - \text{MAX} (T, 7))}$$

In addition, the highest four-day average within the 30-day period shall not exceed 2.5 times the CCC.

The addition of the ammonia criteria is as protective as, and in some cases potentially more stringent than, the updated scientific information and EPA's CWA section 304(a) recommended guidance values contained in EPA's 2006 National Recommended 304(a) Water Quality Criteria. The ammonia criterion equations were compared against the equations found on page 83 of EPA's 1999 Update of Ambient Water Quality Criteria for Ammonia (EPA-822-R-99-014).

In the language formally adopted by the State, Tennessee did not include the phrase "more than once every three years on the average" as part of the CMC and CCC language, as originally proposed, because they did not want to create a requirement that may imply waiting at least six years to determine whether the criterion was exceeded. As currently worded, this allows for a more stringent application of the 1999 ammonia criteria, as allowed for in section 510 of the CWA, and is consistent with 40 CFR § 131.11.

11. 1200-4-3-.03(3)(m) was revised to state:

Biological Integrity - The waters shall not be modified through the addition of pollutants or through physical alteration to the extent that the diversity and/or productivity of aquatic biota within the receiving waters are substantially decreased or adversely affected, except as allowed under 1200-4-3-.06.

Interpretation of this provision for any stream which (a) has at least 80% of the upstream catchment area contained within a single bioregion and (b) is of the appropriate stream order specified for the bioregion and (c) contains the habitat (riffle or rooted bank) specified for the bioregion, may be made using the most current revision of the Department's Quality System Standard Operating Procedure for Macroinvertebrate Stream Surveys and/or other scientifically defensible methods.

Interpretation of this provision for all other wadeable streams, ~~plus large rivers, lakes, and reservoirs, and wetlands,~~ may be made using Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers (EPA/841-B-99-002) or Lake and Reservoir Bioassessment and Biocriteria (EPA 841-B-98-007), and/or other scientifically defensible methods. Interpretation of this provision for wetlands or large rivers may be made using scientifically defensible methods. Effects to biological populations will be measured by comparisons to upstream conditions or to appropriately selected reference sites in the same bioregion if upstream conditions are determined to be degraded.

This revision provides further narrative detail on appropriate assessment procedures for the waterbodies included in this narrative criterion. It also provides detail on the appropriate way to interpret the magnitude component of this narrative statement to ensure the criterion is protective of Tennessee waters. With this specific detail in the water quality standards, the state can provide for more accurate assessment and corrective actions where needed. Therefore, these revisions are consistent with the provisions of 40 CFR § 131.11 and 40 CFR § 131.13.

12. 1200-4-3-.03(3)(n) was revised to state:

Habitat - The quality of instream habitat shall provide for the development of a diverse aquatic community that meets regionally-based biological integrity goals. Types of habitat loss include, but are not limited to: channel and substrate alterations, rock and gravel removal, stream flow changes, accumulation of silt, precipitation of metals, and removal of riparian vegetation. For wadeable streams, the instream habitat within each subcoregion shall be generally similar to that found at reference streams. However, streams shall not be assessed as impacted by habitat loss if it has been demonstrated that the biological integrity goal has been met.

The revisions to the habitat narrative criterion further enhance Tennessee's ability to provide protection to the State's waters by highlighting the types of habitat alteration that are covered by this criterion. This provision is consistent with the CWA and 40 CFR § 131.11.

13. 1200-4-3-.03(3)(o) was added and states:

Flow – Stream or other waterbody flows shall support the fish and aquatic life criteria.

The inclusion of this new narrative criterion language for flow further enhances Tennessee's ability to provide protection for designated and existing uses of the State's waters. The addition of flow as a criterion provides the State a specific mechanism by which to ensure that appropriate flows are maintained for those purposes. In the State's Response to Public Comments, Tennessee stated:

Comment D-12. The new flow criteria should be deleted because the flow is not a "quality" criterion. Removal of flow causes other criteria to be violated, which should be the mechanism for regulating it.

Response: We do not agree. Certainly, if a stream is being used for boating and a water diversion or withdrawal causes it to go dry, then the recreational use is lost. The lack of water is the impairment, even though other criteria may also be violated.

Flow alteration is caused by activities that the department regulates in many instances. We consider having criteria for flow to be appropriate.

Comment G-19. The biological integrity criterion should be modified to add that in addition to physical alterations, removal of water is an activity that can impact aquatic communities.

Response: We consider the removal of water to be a type of physical alteration. The new flow criterion in 1200-4-3-.03(o) makes it clear that flows cannot be altered to the extent that fish and aquatic life criteria are [no] longer met.

In addition to the responses provided above by Tennessee, which are intended to demonstrate how the new flow criterion will provide protection for designated and existing uses, habitat and biological integrity can be impacted by flow in a way that can be detrimental to the

use, not to mention impacting specific chemical parameters (i.e., dissolved oxygen and temperature). Whereas parameters such as dissolved oxygen and temperature have specific numeric values associated with levels that support a specific designated use, the inclusion of the new minimum flow language in 1200-4-3-.05(4) will be critical to Tennessee's ability to interpret the narrative flow criteria in 1200-4-3-.03(3)(o), as well as other narrative-based criteria in the water quality standards. Further discussion of 1200-4-3-.05(4), which contained revisions related to minimum flows, is included as part of the review for item # 28 of this document. Tennessee's decision to specify flow as a narrative criterion in the water quality standards regulations is within the scope of EPA's regulations, which allow for narrative criteria, and will allow the State to make water quality decisions, such as permitting and antidegradation.

This provision is consistent with the CWA and 40 CFR § 131.11.

14. 1200-4-3-.03(4)(b) was revised to state:

pH - The pH value shall lie within the range of 6.0 ~~5.5~~ to 9.0 and shall not fluctuate more than 1.0 unit in this range over a period of 24 hours.

At the time of agency action on Tennessee's water quality revisions on September 30, 2004, EPA chose to defer action on the then revised pH criterion lower bound of 5.5 standard units for this provision. During the most recent triennial review, Tennessee reevaluated this portion of the pH criterion section for the Recreation use and deleted the 2004 pH lower bound of 5.5 standard units after the State determined that 6.0 standard units, the pH criterion value that EPA Region 4 had previously reviewed and approved prior to the September 30, 2004 action, and the applicable pH criterion for CWA purposes, was, in fact, the appropriate criterion for the Recreation use. Because EPA did not act on the September 30, 2004 revisions to the pH lower bound of 5.5 standard units, the pH criterion currently effective for CWA purposes is the statewide range of 6.0-9.0 standard units adopted by Tennessee prior to the September 23, 2003 adoption and approved by EPA prior to the September 30, 2004 action. Because the current criterion is identical to the criterion previously reviewed and approved by EPA, there is no new or revised pH lower bound for the Recreation use before the Agency requiring EPA action. EPA notes for the sake of clarity that the pH criterion range of 6.0-9.0 standard units previously adopted by the State and approved by EPA prior to the September 30, 2004 action remains the applicable pH criterion for the Recreation use effective for CWA purposes.

15. 1200-4-3-.03(4)(d) was revised to state:

Total Suspended Solids, Turbidity or Color - There shall be no total suspended solids, turbidity or color in such amounts or character that will result in any objectionable appearance to the water, considering the nature and location of the water.

The inclusion of language regarding total suspended solids further refines the protection provided by this narrative criterion provision. The addition of this language provides a specific parameter for protection of Tennessee waters. With this specific detail in the water quality standards, the state can provide for more accurate assessment and corrective actions where needed to ensure protection of the designated uses. This is consistent with 40 CFR § 131.11.

16. 1200-4-3-.03(4)(f) was revised to state:

Coliform - The concentration of the E. coli group shall not exceed 126 colony forming units per 100 ml, as a geometric mean based on a minimum of 5 samples collected from a given sampling site over a period of not more than 30 consecutive days with individual samples being collected at intervals of not less than 12 hours. For the purposes of determining the geometric mean, individual samples having an E. coli concentration of less than 1 per 100 ml shall be considered as having a concentration of 1 per 100 ml.

Additionally, the concentration of the E. coli group in any individual sample taken from a lake, reservoir, State Scenic River, ~~or Exceptional Tennessee Water or ONRW Tier II or III stream~~ (1200-4-3-.06) shall not exceed 487 colony forming units per 100 ml. The concentration of the E. coli group in any individual sample taken from any other waterbody shall not exceed 941 colony forming units per 100 ml.

In the State's Response to Public Comments, Tennessee stated:

Comment H-5. In the existing regulation, the E. coli criterion for any Tier 2 water is set at 487. The new proposal would change the characteristics for high quality waters. If some of these waters are no longer Tennessee Exceptional Waters under the revisions, the E. coli criterion would be raised to 941. What is Tennessee's basis for being comfortable with the lowering the criteria in these waters[?]

Response: The commenter is correct that under the proposed new characteristics for Tennessee Exceptional Waters, some waters that might have been considered Tier 2 under the previous rule, will no longer be captured, thus changing the E. coli criterion for those streams. It is also true that the changes will cause other streams, not previously captured as Tier 2 under the old rule, to now be Exceptional Tennessee Waters under the new rule. There will clearly be some exchange of streams between the old and new categories.

The main difference between the old and new characteristics is in the area of biological integrity and presence of listed species. Thus, any changes will be made more on the basis of the fish and aquatic life use, rather than recreational uses. The 941 criterion for streams is clearly within the range EPA considers acceptable for recreational use.

The use of two values reflects a difference in the confidence level, which is related to the frequency of use, selected by the State to be protective of the recreation level associated with each category of water. The frequency of recreation associated with waters known as "lake, reservoir, State Scenic River, Exceptional Tennessee Waters, or ONRW" is expected to be higher than that of the remaining waters in the state, and thus a more stringent maximum criterion value is used for this specific subset of state waters. Therefore, even though the names used for the different antidegradation classifications have changed, the two criterion maximums remain EPA's recommended values for their respective levels of recreation, and are still considered by EPA to be protective of the recreational use. This revision is consistent with the CWA and Part 131.

17. 1200-4-3-.03(4)(h) now states:

Nutrients - The waters shall not contain nutrients in concentrations that stimulate aquatic plant and/or algae growth to the extent that the public's recreational uses of the waterbody stream or other downstream waters are detrimentally ~~effected~~ affected. Unless demonstrated otherwise, the nutrient criteria found in 1200-4-3-.03(3)(~~ik~~) will be considered adequately protective of this use.

Tennessee continues to refine and develop both their nutrient expertise and subsequent implementation of this provision by making revisions to their voluntary nutrient criteria development plan. This plan was most recently revised and submitted to EPA for mutual agreement in September 2007. Mutual agreement on the revised plan was reached September 25, 2007. With regard to the specific revisions above, Tennessee revised the nutrient narrative to clarify that all waterbodies are intended to be addressed by this provision, in addition to the minor editorial revision. These revisions are consistent with the CWA and Part 131.

18. 1200-4-3-.03(4)(i) now states:

Nutrient Response Criteria for Pickwick Reservoir: those waters impounded by Pickwick Dam on the Tennessee River. The reservoir has a surface area of 43,100 acres at full pool, 9,400 acres of which are within Tennessee. Chlorophyll *a* (corrected, as described in *Standard Methods for the Examination of Water and Wastewater*, 20th Edition, 1998): the mean of the photic-zone (See definition) composite chlorophyll *a* samples collected monthly April through September shall not exceed 18 µg/l, as measured over the deepest point, main river channel, dam forebay.

Tennessee chose to adopt the same criterion for Pickwick Lake, an interstate lake shared by Tennessee and Alabama, which Alabama adopted as part of its own rulemaking process on April 9, 2002. The criterion adopted by Alabama for Pickwick Lake was approved by EPA on March 10, 2004. As outlined in EPA's March 10, 2004 approval letter to Alabama Department of Management (ADEM), "The State has appropriately adopted site-specific chlorophyll *a* criteria for these lakes based on historical data and scientific research to reflect local conditions consistent with EPA's regulations and guidance. The State's approach results in criteria values that protect the designated uses for each of these lakes." Based on email correspondence dated July 2, 2007, and included as Attachment B, TDEC concurred with ADEM's rationale for the chlorophyll *a* criterion and did not wish to provide any additional supporting materials.

The only difference in language is the use of the phrase "over the deepest point" versus Alabama's "at the deepest point." In practice the two locations are meant to represent the same compliance point, Tennessee choose the term "over" to prevent confusion in meaning among the public that had arisen during Alabama's rulemaking process.

The designated uses which apply to the Tennessee River (Pickwick Lake) within Alabama include Public Water Supply, Swimming, and Fish and Wildlife. The designated uses which apply to the Tennessee River within Tennessee include Domestic Water Supply, Industrial Water Supply, Fish and Aquatic Life, Recreation, Livestock Watering and Wildlife, and

Irrigation. Therefore, Tennessee's addition of a chlorophyll *a* criterion for Pickwick Lake is consistent with the CWA and 40 CFR Part 131.

19. 1200-4-3-.03(4)(j) was revised to incorporate updated numeric values and carcinogenic status into the criteria table. The revisions are summarized in Attachment C.

The revised criteria reflect the updated scientific information and EPA's CWA section 304(a) recommended guidance values contained in EPA's 2006 National Recommended 304(a) Water Quality Criteria.

20. The last paragraph of 1200-4-3-.03(4)(l) was revised to state:

...For substances for which the public health concern is based on toxicity, a "do not consume" advisory will be considered warranted when average levels of the substance in the edible portion of fish exceed U.S. Food and Drug Administration (FDA) Action Levels or EPA national criteria. Based on the rationale used by FDA or EPA for their levels, the Commissioner may issue precautionary advisories at levels appropriate to protect sensitive populations.

This revision has been determined not to be subject to 303(c) review because fish consumption advisories are not part of the water quality standards and therefore the basis for issuing a fish consumption advisory is not a water quality standard under 303(c) of the CWA. A state has the option to choose whether or not to include fish consumption advisories in the management of a state's water resources. We are recommending that we not take action with regard to this provision. When the revised standards are updated on EPA's water quality standards Repository of Documents page, the Region will make sure to list the provisions that have not been acted on under 303(c) of the CWA, such as this one.

21. 1200-4-3-.03(4)(m) was added and states:

Flow – Stream flows shall support recreational uses.

The inclusion of this new narrative criterion language for flow further enhances Tennessee's ability to provide protection for designated and existing uses of the State's waters. The addition of flow as a criterion provides the State a specific mechanism by which to ensure that appropriate flows are maintained for those purposes. In the State's Response to Public Comments, Tennessee stated:

Comment D-12. The new flow criteria should be deleted because the flow is not a "quality" criterion. Removal of flow causes other criteria to be violated, which should be the mechanism for regulating it.

Response: We do not agree. Certainly, if a stream is being used for boating and a water diversion or withdrawal causes it to go dry, then the recreational use is lost. The lack of water is the impairment, even though other criteria may also be violated.

Flow alteration is caused by activities that the department regulates in many instances. We consider having criteria for flow to be appropriate.

Comment G-19. The biological integrity criterion should be modified to add that in addition to physical alterations, removal of water is an activity that can impact aquatic communities.

Response: We consider the removal of water to be a type of physical alteration. The new flow criterion in 1200-4-3-.03(o) makes it clear that flows cannot be altered to the extent that fish and aquatic life criteria are [no] longer met.

In addition to the responses provided above by Tennessee, which are intended to demonstrate how the new flow criterion will provide protection for designated and existing uses, habitat and biological integrity can be impacted by flow in a way that can be detrimental to the use, not to mention impacting specific chemical parameters (i.e., dissolved oxygen and temperature). Whereas parameters such as dissolved oxygen and temperature have specific numeric values associated with levels that support a specific designated use, the inclusion of the new minimum flow language in 1200-4-3-.05(4) will be critical to Tennessee's ability to interpret the narrative flow criteria in 1200-4-3-.03(4)(m), as well as other narrative-based criteria in the water quality standards. Further discussion of 1200-4-3-.05(4), which contained revisions related to minimum flows, is included as part of the review for item # 28 of this document. Tennessee's decision to specify flow as a narrative criterion in the water quality standards regulations is within the scope of EPA's regulations, which allow for narrative criteria, and will allow the State to make water quality decisions, such as permitting and antidegradation.

This provision is consistent with the CWA and 40 CFR § 131.11.

C. Changes within 1200-4-3-.04 Definitions

The definitions were reorganized as part of this rulemaking but the following only addresses individual definitions which had revisions to the language itself.

22. 1200-4-3-.04(4) was separated into a revised (3) and (4):

(3) Degradation - The alteration of the properties of waters by the addition of pollutants or removal of habitat.

(4) *De Minimis* - Alterations other than those not resulting in the condition of pollution or new domestic wastewater discharges, that represent either a small magnitude or a short duration shall be considered a *de minimis* impact and will not be considered degradation; ~~are of a temporary nature or those alterations having de minimus impact (no measurable or less than 5 percent loss of assimilative capacity) will not be considered degradation for~~ purposes of implementing the antidegradation policy. Discharges other than domestic wastewater will be considered *de minimis* if they are temporary or use less than five percent of the available assimilative capacity for the substance being discharged. Water withdrawals will be considered *de minimis* if less than five percent of the 7Q10 flow of the stream is removed (the calculations of the low flow shall take into account existing

withdrawals). Habitat alterations authorized by an Aquatic Resource Alteration Permit (ARAP) are *de minimis* if the division finds that the impacts are offset by a combination of impact minimization and/or in-system mitigation.

If more than one activity has been authorized in a segment and the total of the impacts uses no more than ten percent of the assimilative capacity, available habitat, or 7Q10 low flow, they are presumed to be *de minimis*. Where total impacts use more than ten percent of the assimilative capacity, available habitat, or 7Q10 low flow they may be treated as *de minimis* provided that the division finds on a scientific basis that the additional degradation has an insignificant effect on the resource and that no single activity is allowed to consume more than five percent of the assimilative capacity, available habitat or 7Q10 low flow. ~~Degradation will not be considered *de minimis* if a substantial loss (more than 50 percent) of assimilative capacity has already occurred.~~

An analysis of the revisions to the definition of degradation, and subsequent addition of a *de minimis* definition, will be discussed as part of item # 30 within this document. Item #30 provides more detail as well as relevant attachments.

23. 1200-4-3-.04(6), (7), and (12) were revised to state:

(6) Epilimnion – The upper layer of water in a thermally stratified lake or reservoir. This layer consists of the warmest water and has a fairly uniform (constant) temperature.

(7) Hypolimnion - The lowest layer in a thermally stratified lake or reservoir. This layer consists of colder, more dense water, has a constant temperature and no mixing occurs. The hypolimnion of a eutrophic lake is usually low or lacking in oxygen.

(12) Stratification – The tendency in lakes and reservoirs for distinct layers of water to form as a result of vertical change in temperature and, therefore, in the density of water. During stratification, dissolved oxygen, nutrients, and other parameters of water chemistry do not mix well between layers, establishing chemical as well as thermal gradients.

By explaining the terms used in the temperature criterion section (1200-4-3-.03(3)(e)), the State is providing specific information to ensure that the criteria are protective of the designated use. This is consistent with the provisions of 40 CFR § 131.11.

24. 1200-4-3-.04(9) was revised to state:

Photic Zone - the region of water through which light penetrates and where photosynthetic organisms live.

By explaining the term used in the nutrient response criterion for Pickwick Reservoir section (1200-4-3-.03(4)(i)), the State is providing specific information to ensure that the criterion is protective of the designated use. This is consistent with the provisions of 40 CFR § 131.11.

25. 1200-4-3-.04(14) was revised to state:

Thermocline – The middle layer in a thermally stratified lake or reservoir. In this layer there is a rapid decrease in temperature with depth. Also called the metalimnion.

This definition provides additional information on lake terminology and is consistent with the provisions of 40 CFR § 131.11 and 40 CFR § 131.13.

26. 1200-4-3-.04(15) was revised to state:

Wadeable streams - Streams that can be sampled using a hand held, one meter square or smaller kick net without water and materials escaping over the top of the net.

By explaining the term used in various revisions to criteria within Chapter 1200-4-3, the State is providing specific information to ensure that the criterion is protective of the designated use. This is consistent with the provisions of 40 CFR § 131.11.

D. Changes within 1200-4-3-.05 Interpretation of the Criteria

27. 1200-4-3-.05(2) was revised to state:

The effect of treated sewage or waste discharge on the receiving waters shall be considered beyond the mixing zone except as provided in this paragraph. ~~after they are mixed with the waters and beyond a reasonable zone of immediate effect.~~ The extent to which this is practicable depends upon local conditions and the proximity and nature of other uses of the waters. Such mixing zones (See definition) shall be restricted in area and length and shall not (i) prevent the free passage of fish or cause aquatic life mortality in the receiving waters; (ii) contain materials in concentrations that exceed ~~recognized acute criteria toxicity levels;~~ beyond the zone immediately surrounding the outfall; ~~for biota representative of the aquatic community in the receiving waters;~~ (iii) result in offensive conditions; (iv) produce undesirable aquatic life or result in dominance of a nuisance species; (v) endanger the public health or welfare; or (vi) adversely affect the reasonable and necessary uses of the area; (vii) create a condition of chronic toxicity beyond the edge of the mixing zone; ~~and~~ (viii) adversely affect nursery and spawning areas; or (ix) adversely affect species with special state or federal status.

Page 5-1 of the WQS Handbook states “[m]ixing zones should not be permitted where they may endanger critical areas (e.g., drinking water supplies...areas with sensitive biota).” The inclusion of this new language supplements Tennessee’s previous protections with regards to mixing zone location, specifically, those waters with species of special state or federal status. This provision is consistent with the CWA and 40 CFR Part 131.11.

28. 1200-4-3-.05(4) was revised to state:

Water quality criteria for ~~The~~ fish and aquatic life and livestock watering and wildlife criteria set forth shall generally be applied on the basis of the following stream flows: unregulated streams - stream flows equal to or exceeding the 7-day minimum, 10-year

recurrence interval; regulated streams - all flows in excess of the minimum critical flow occurring once in ten years as determined by ~~an analysis of records of operation and approved by the Commissioner of the Tennessee Department of Environment and Conservation division.~~ However, criteria that are wholly or partially based on direct measurements of ambient aquatic community health, such as the nutrient, biological integrity, and habitat criteria for the fish and aquatic life use, shall support the designated use. These criteria should be considered independent of a specified minimum flow duration and recurrence. All other criteria shall be applied on the basis of stream flows equal to or exceeding the 30 day minimum ~~25~~ year recurrence interval.

EPA's Technical Support Document for Water Quality-based Toxics Control [EPA/505/2-90-001, March 1991] (TSD) includes recommendations for using specific flows to implement toxics criteria to establish wasteload allocations (WLAs) and Total Maximum Daily Loads (TMDLs) for streams. Through the use of a recommended flow (or design flow) from the TSD in developing WLAs or TMDLs for streams, the criteria are expected to be protected during the vast majority of environmental conditions, including conditions where the stream flows are equal to or exceed the critical flow. The recommended flows in the TSD for implementing the criteria for certain pollutant categories are based on protection against the effects of the pollutants in consideration of the duration of exposure.

The TSD recommends using flows equal to the 30-day minimum, 5-year recurrence interval (30Q5) for implementing criteria to protect human health from non-carcinogenic substances. This recommendation is based on the rationale that the human health effects from non-carcinogens are associated with a short-term duration of exposure (i.e., 90 days or less).

With respect to interpretation of criteria for all of the State's designated uses other than fish and aquatic life and livestock watering (i.e., "All other criteria"), the revision above provides additional protection to that which was previously adopted by the State. "All other criteria" were previously applicable for flows equal to or exceeding the 30 day minimum 2 year recurrence interval (30Q2), which is a statistical representation of the vast majority of potential flow conditions for streams. For all streams, the 30Q5 represents a lower flow value than the 30Q2. Therefore, the above revision maintains protection for flows equal to or exceeding the 30Q2 and adds protection for flows that are equal to or exceed 30Q5 but are less than the 30Q2.

EPA has not published specific guidance with respect to the appropriate instream flows for use in the application of nutrient, habitat, or biological integrity criteria. Generally, the expression of the duration of nutrient criteria may dictate the most appropriate instream flow statistic that could be used to apply the criteria for a given set of circumstances. However, with respect to interpretation of criteria that are "wholly or partially based on direct measurements of ambient aquatic community health," Tennessee has chosen not to set a specified minimum flow duration and recurrence. Page 111 of EPA's July 2000 *Nutrient Criteria Technical Guidance Manual for Rivers and Streams* (EPA-822-B-00-002) states the following with regards to low flow provisions:

State and Tribal water quality standards should protect water quality for the designated and existing uses in critical low-flow situations. States and Tribes may, however, designate a critical low-flow below which numerical water quality criteria do not apply.

When reviewing standards, States and Tribes should review their low-flow provisions for conformance with EPA guidance.

Tennessee's decision to specify minimum flows as a specific criterion in the water quality standards regulations is within the scope of the above guidance. The inclusion of the new flow criteria in 1200-4-3-.03(3)(o) and 1200-4-3-.03(4)(m) will be critical to Tennessee's ability to support those narrative criteria (i.e., nutrient, habitat, and biological integrity) which are intended to apply regardless of a minimum flow duration and recurrence. With specific criteria in place for flow, as well ensuring maintenance of certain flows, protection will be provided for the designated and existing uses of the State's waters.

The response to comments included below gives additional detail regarding the intended application of the new and revised flow criteria language.

In the State's Response to Public Comments, Tennessee stated:

Comment G-22. The new flow criterion should be modified to require the maintenance of natural flow regimes and the habitats of the full range of species that might be expected to occur there.

Response: We believe the simpler language proposed by the department will provide the flexibility needed to protect the important resource values of the individual waters, whether or not the flow regime is "natural."

Comment G-23. How would the new flow criterion be interpreted in intermittent streams or other streams that go dry from time to time.

Response: The commenter is correct that many streams go dry from time to time due to natural conditions. When those streams would have enough flow to maintain aquatic life, the criteria would prevent them from being altered to the extent that they would no longer support that aquatic life.

Because of the interrelated nature of the protections afforded by the nutrient, habitat, and biological integrity criteria, as well as the impact of flow on these three aspects of aquatic life protection, Tennessee has specifically stated that the application of these criteria is "independent of a specified minimum flow duration and recurrence" in order to ensure that their standards protect water quality for the designated and existing uses. Furthermore, the effect of these criteria on fish and aquatic life in streams is dependent on the duration of exposure, which may vary from a short-term period (i.e., 90 days or less) to a long-term period (i.e., a growing season as long as seven months). The application of Tennessee's nutrient, habitat, and biological integrity criteria for "independent of a specified minimum flow duration and recurrence" is expected to provide protection for the fish and aquatic life use for any duration of exposure and within the flexibility available to a state in 40 CFR 131.13 for inclusion of low flow policies in state water quality standards.

At the time of agency action on Tennessee's water quality revisions on September 30, 2004, and following Tennessee's request, EPA chose to defer action on the revision to the instream design flow of 30Q5 for the application of water quality criteria. During the current triennial review, Tennessee reevaluated this provision. Because EPA deferred action on this revision, the implementation of this provision, as effective for CWA purposes, was consistent with the language previously approved by EPA. Now the revision above is consistent with the State's intent for the criteria contained in 1200-4-3-.03(3)(k), (m), and (n) and is consistent with the CWA and 40 CFR Part 131. We recommend approval of the language, as submitted to us on July 20, 2007. This effectively concludes our review of this provision, as contained in the State's October 24, 2003 and July 20, 2007 submissions.

29. The heading on the detection level table within 1200-4-3-.05(8) was revised to state:

REQUIRED METHOD DETECTION LEVELS [RDL] (ug/l)
(Approved EPA Methods Must Be Used)

The inclusion of the new language further enhances Tennessee's ability to provide protection to the State's waters. This provision is consistent with the Clean Water Act and 40 CFR Part 131.

E. Changes within 1200-4-3-.06 Antidegradation Statement

30. Due to the extent of the revisions and subsequent analysis, Attachment D has been included to summarize the previous language, as approved on September 30, 2004, and Attachment E has been included to summarize the language adopted on October 24, 2006. The following discussion addresses the analysis of the revisions to 1200-4-3-.04(3), 1200-4-3-.04(4), and 1200-4-3-.06, submitted by the State on July 20, 2007.

During the 2006 triennial review, Tennessee has revised its antidegradation policy and implementation framework for each tier of the antidegradation statement. The new framework is established in 1200-4-3-.06 Paragraphs (1) through (7).

Paragraph (1) contains the antidegradation policy statement for protection of existing uses, the antidegradation policy statement for protection of high quality waters, and the policy statement for implementation of the antidegradation policy regarding consistency with activities authorized under § 316 of the Clean Water Act (CWA). This Paragraph also addresses "sources exempted from permit requirements under the Water Quality Control Act," e.g., nonpoint sources, and describes the organization of the implementation methodology for the various tiers of protection in the Tennessee water quality standards.

Paragraph (2) contains the State's antidegradation statement for protection of existing uses.

Paragraph (3) contains the State's antidegradation statement for waters of the State with available conditions, i.e., a portion of the high quality waters in the State.

Paragraph (4) contains the State's selection criteria and antidegradation statement for Exceptional Tennessee Waters, i.e., the remaining portion of the high quality waters in the State.

Paragraph (5) contains the State's designation process, antidegradation policy statement, and the listing of Outstanding National Resource Waters in the State.

Paragraph (6) contains statements relating to requirements for wastewater treatment for discharges of "municipal sewage, industrial waste, or other waste."

Paragraph (7) contains statements relating to cooperation between the State and federal agencies authorized to carry out provisions of the CWA.

All references to "Tier I," "Tier II," and "Tier III" waters in the antidegradation policy and implementation statement were deleted.

In addition, the State revised definitions for two of the terms that are used to determine compliance with implementation of the antidegradation policy. The terms "degradation" and "*de minimis*" are defined in 1200-4-3-.04(3) and (4), respectively. The revised portions of these two definitions are reviewed in the context of the provisions of the antidegradation statement that refer to these terms, starting on page 35.

In the presentation or discussion of Tennessee's antidegradation statement below, any text shown in bold was either added as a new provision or as a revision to the previously adopted and EPA-approved provisions of Tennessee's water quality standards. EPA approved the previously adopted version of the antidegradation statement on September 30, 2004.

EPA, in a letter dated December 3, 2007, from James D. Giattina, Director, Region 4 Water Management Division, to Paul Davis, Director, Tennessee Division of Water Pollution Control (the December 3, 2007 letter), requested additional information regarding the State's implementation of the Tennessee Antidegradation Statement. See Attachment G. EPA received the State's responses to those questions in a letter dated February 27, 2008, from Paul Davis, Director, Tennessee Division of Water Pollution Control, to James D. Giattina, Director, EPA Region 4 Water Management Division (the February 27, 2008 letter). See Attachment H. The information provided in the State's February 27, 2008 letter was used to supplement the information and documents submitted with the State's new and revised water quality standards adopted during the 2006 triennial review.

1200-4-3-.06 Paragraph (1)

It is the purpose of Tennessee's standards to fully protect existing uses of all surface waters as established under the Act. Existing uses are those actually attained in the water body on or after November 28, 1975. **Additionally**, the Tennessee Water Quality Standards shall not be construed as permitting the degradation (see definition) of high quality surface waters. **Where the quality of Tennessee waters is better than the level necessary to support propagation of fish, shellfish, and wildlife, and recreation in and on the water, that quality will be maintained and protected unless the state**

finds, after intergovernmental coordination and public participation, that lowering water quality is necessary to accommodate important economic or social development in the area in which the waters are located.

Sources exempted from permit requirements under the Water Quality Control Act should utilize all cost-effective and reasonable best management practices. Activities that cause or contribute to non-compliance with a water quality standard will not be allowed.

Activities proposed for waters that are not identified as either being Exceptional Tennessee Waters (1200-4-3-.06(4)) or Outstanding National Resource Waters (1200-4-3-.06(5)), will be evaluated on the basis of 1200-4-3-.06(2) and (3).

Where new or increased temperature alterations are proposed, a successful demonstration as determined by the state under Section 316(a) of the Clean Water Act, 33 U.S.C. §1326, shall be considered to be in compliance with this section.

Analysis of 1200-4-3-.06 Paragraph (1)

The first three sentences of this Paragraph were retained from the previous water quality standards.

The fourth sentence was added to include the overall policy for protection of high quality waters, which include waters with available conditions and Exceptional Tennessee Waters. This provision may have been inadvertently deleted from the standards during the previous triennial review, when the State first incorporated the details of the antidegradation statement into 1200-4-3-.06. In the State's Response to Public Comments, Tennessee stated:

Comment K-1: In moving things around, Tennessee seems to have lost some of the elements of its previous umbrella statement of purpose for the antidegradation policy.

Response: We agree and will make this change in 1200-4-3-.06(1).

The new provision is almost identical to the first sentence of the federal policy for protection of high quality waters at 40 CFR § 131.12(a)(2). The differences between the two regulations do not result in a change in effect or meaning from the federal provision. For example, Tennessee's standards include the phrase "Where the quality of Tennessee waters is better than the level necessary to support propagation of fish, shellfish, and wildlife, and recreation in and on the water, ..." and the federal provision states, "Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, ..." Minor differences between the two are not significant. In the State's Response to Public Comments, Tennessee made several statements that clarify the waters in the State to which this portion of the antidegradation policy will apply. These include the following:

Comment K-3: 1200-4-3-.06(1) suggests that the state must make a determination of social and economic need when authorizing degradation in water other than Exceptional

Tennessee Waters. This should be clarified to indicate that such a determination is restricted to Exceptional Tennessee Waters.

Response: The proposed language in 1200-4-3-.06(1) is accurate. Where water quality exceeds the level needed to maintain uses, the state must make a determination that the change in water quality is in the public interest. The suggested change would likely be disapproved by EPA.

Comment K-11: The proposed category of Exceptional Tennessee Waters should be called “High Quality Waters” instead.

Response: The suggested change would reestablish the type [of] confusion we are trying to avoid. Under the federal regulation, our “Available Waters” category is also considered “high quality.”

Also, in a letter dated March 23, 2007, from Paul E. Davis, Director, Tennessee Division of Water Pollution Control, to James D. Giattina, Director, EPA Region 4 Water Management Division (the March 23, 2007 letter), the State clarified the applicability of this provision, as follows:

Our protections for high quality waters are no less stringent than the federal requirements as demonstrated by the fact that the exact federal language found in 40 CFR 131.12(a)(2) is repeated in the first paragraph [1200-4-3-.06(1)]. The description of high quality waters given in that passage clearly applies to the category later described as Available Conditions [1200-4-3-.06(3)]. But to be clear about this, when a permit applicant seeks to degrade the high quality parameter(s) of Available Conditions waters, if we grant the application, we have made the determinations required by 1200-4-3-.06(1), including the determination that there is economic or social necessity for the degradation.

In consideration of the above, EPA finds that this policy statement is consistent with 40 CFR § 131.12(a)(2).

The fifth and sixth sentences were retained from the previous water quality standards.

The seventh sentence was added to refer to the new framework of 1200-4-3-.06 for details of implementing the State’s antidegradation policy for proposed activities affecting water quality: Paragraph (4) – Exceptional Tennessee Waters, Paragraph (5) – Outstanding National Resource Waters, and Paragraphs (2) and (3) – all other waters.

The eighth sentence was added as a new provision in the Tennessee antidegradation policy statement during the 2006 triennial review and provides consistency with 40 CFR § 131.12(a)(4), which states, “In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with section 316 of the Act.” Tennessee’s antidegradation policy did not include a statement that addressed the 40 CFR § 131.12(a)(4) provision prior to this triennial review.

EPA has interpreted this part of the federal antidegradation policy in the Water Quality Standards Handbook, Second Edition, August 1994, EPA-823-B-94-005a, as follows:

The requirement for potential water quality impairment associated with thermal discharges contained in section 131.12(a)(4) of the regulation is intended to coordinate the requirements and procedures of the antidegradation policy with those established in the Act for setting thermal discharge limitations. Regulations implementing section 316 may be found at 40 CFR 124.66. The statutory scheme and legislative history indicate that limitations developed under section 316 take precedence over other requirements of the Act.

The provisions of 40 CFR § 131.12(a)(4) are “intended to coordinate the requirements and procedures of the antidegradation policy with those established in the CWA for setting thermal discharge limitations. ... The statutory scheme and legislative history indicate that limitations developed under section 316 take precedence over other requirements of the CWA.” EPA Advance Notice of Proposed Rulemaking, 63 FR 36787 (July 7, 1998). If a proper showing is made under CWA § 316, the federal policy allows NPDES permits to contain thermal effluent limitations which are less stringent than those which might otherwise be required under CWA § 301(b)(1)(C) to implement State antidegradation requirements. The revision to Tennessee’s antidegradation policy simply states this in another way, in that where “new or increased temperature alterations are proposed,” a State determination that these alterations comply with CWA § 316 requirements is considered to result in compliance with the provisions of 1200-4-3-.06.

1200-4-3-.06 Paragraph (2)

Unavailable conditions exist where water quality is at, or fails to meet, the criterion for one or more parameters. In unavailable conditions, new or increased discharges of a substance that would cause or contribute to a condition of impairment will not be allowed. Where impairment by habitat alteration exists, additional significant loss of habitat within the same area of influence shall not be authorized unless avoidance, minimization, or in-system mitigation can render the impact *de minimis*.

[This is a restatement of the Tier 1 provision which was deleted from Paragraph (1):

“In bodies of water identified as Tier I by the Division, existing uses will be maintained by application of the General Water Quality Criteria. In Tier I waters found to not meet water quality standards for a substance, new or increased discharges of that substance will not be allowed.”]

Analysis of 1200-4-3-.06 Paragraph (2)

This Paragraph comprises the State’s antidegradation statement for protection of existing uses. It addresses the protection of existing uses in relation to point source discharges to State waters as well as water withdrawals and alteration of habitat, such as dredging and/or filling

activities regulated under the State's ARAP program. EPA's analysis of the new and revised provisions relating to *de minimis* determinations starts on page 35.

For point source discharges, if a water quality criterion (or multiple criteria) for a substance (substances) is (are) not being met, the methodology requires that "new or increased discharges of a substance that would cause or contribute to a condition of impairment will not be allowed." This provision addresses the potential for additional lowering of water quality by point source discharges to waters where (1) there is no assimilative capacity for a parameter(s), or (2) a water body fails to meet applicable water quality criteria for a parameter(s). In the State's Response to Public Comments, Tennessee stated:

Comment C-6: If the status of a stream under the antidegradation policy is unknown, then the default presumption should be that it is high quality.

Response: Our current antidegradation implementation procedure is based on the need to accurately characterize the proper category for a stream before considering authorization of an activity. Some of the revisions we have proposed would relieve the administrative burden on the state by simplifying the characteristics of high quality waters.

Comment C-7: If the status of a stream under the antidegradation policy is unknown, then the default presumption should be that it is not high quality.

Response: An antidegradation policy with default presumption that streams are not high quality would invite federal disapproval of Tennessee's implementation procedures. We cannot recommend this course of action.

During the permitting process for a new or expanded discharge, the State will make a determination as to whether a receiving water is one with unavailable conditions, available conditions or whether the water body qualifies for protection as an Exceptional Tennessee Water. That determination will govern which set of requirements apply to the antidegradation implementation process. EPA's December 3, 2007 letter included the following questions in regard to the State's process to identify waters with unavailable conditions:

For waters where little or no ambient water quality information is available, how will the State make a determination that a receiving stream has either unavailable or available conditions? Once a determination is made that a receiving stream has unavailable conditions during the NPDES or other permitting processes, is that water body added to the CWA section 305(b) and/or 305(b) lists for the State? In the February 27, 2008 letter, the State responds:

Where no water quality data exists for a receiving stream, the division presumes that the water has available conditions and any applicant must meet the requirements of 1200-4-3-.06(3). For new or expanded discharges or activities, the division uses the criteria in 1200-4-3-.06(4)(a) to determine whether or not the water is considered an Exceptional Tennessee Water. The division determines whether or not a water is impaired based upon available ambient water quality monitoring data. Streams that are found to be

impaired are added to the 303(d) list at the time of update. Of course, any antidegradation determinations would be made based on the actual impairment status as opposed to a 303(d) listing.

EPA also asked that the State provide information regarding the process for public review of the State's receiving water determinations. In the December 3, 2007 letter, EPA posed the following questions, "Does the Fact Sheet or Statement of Basis for a proposed permit include information as to which antidegradation category the receiving stream falls into? Is this part of what the public then can comment on?" In the February 27, 2008 letter, the State responded, "The NPDES permit rationale does include information on the water quality status of the receiving water. The public can certainly comment upon the division's basis for setting permit limitations and standards.

Tennessee's provision governing waters with unavailable conditions is consistent with the approach taken by EPA in the development of Guidance for Water Quality for the Great Lakes. In the proposed rule, EPA stated:

The first provision of the Great Lakes antidegradation standard differs from the existing Federal policy in that it explicitly prohibits the lowering of water quality in situations where either an existing or a designated use is impaired. The Federal policy does not include the designated use reference. This prohibition is applied on a pollutant by pollutant basis and serves as a restriction on the specific pollutant or pollutants that are impairing the designated use. ... While this proposed provision differs from the existing Federal antidegradation policy on its face, it is not more stringent than section 301(b)(1)(C) of the CWA or the other regulations that EPA has adopted to protect water quality. ... Thus the prohibition in the proposed Guidance on the lowering of water in situations where a designated use is impaired simply brings the antidegradation guidance into explicit conformance with other regulatory requirements regarding the protection of water quality. In the context of the whole of the proposed Guidance, this provision would preclude the lowering of water quality for a pollutant or pollutants in situations where the concentration of the pollutant or pollutants exceeds the proposed Great Lakes water quality criteria. 58 FR 20892 (April 16, 1993)

Since "unavailable conditions exist where water quality is at, or fails to meet, the criterion for one or more parameters," Tennessee's approach as described in Paragraph (2) applies to a new or increased discharge of each substance or substances that has or have caused a water body to be impaired or may cause a water body with conditions at criteria levels to be impaired. Therefore, the requirement that "new or increased discharges of a substance that would cause or contribute to a condition of impairment will not be allowed" would apply even if the proposed activity also involved the discharge of other substances for which there is available assimilative capacity in the receiving water. For example, if a water body was impaired due to the presence of copper, and a new facility proposed to discharge both copper and zinc to the water body, the new or expanded discharge would not be allowed unless the discharge of copper was limited to levels that would not cause or contribute to the impairment. Additionally, even if the discharge met the "not cause or contribute" requirement for copper, the new or expanded discharge of zinc would be required to undergo a review based on the water body's classification

of either having “available conditions” for zinc, or as qualifying for protection as an Exceptional Tennessee Water.

Therefore, EPA finds that the new and revised provisions of 1200-4-3-.06 Paragraph (2) relating to the category of waters with unavailable conditions and protection of existing uses are consistent with 40 CFR § 131.12.

1200-4-3-.06 Paragraph (3)

Available conditions exist where water quality is better than the applicable criterion for a specific parameter. In available conditions, new or additional degradation for that parameter will only be allowed if the applicant has demonstrated to the department that reasonable alternatives to degradation are not feasible.

(a) Analysis of reasonable alternatives shall be part of the application process and shall include a discussion of the feasibility of **all potential alternatives, plus the** social and economic considerations and environmental consequences of each. Alternatives analyses shall include, at a minimum, completed and accurate Worksheets A and B for public sector applicants or Worksheets A and G for private system applicants, except where these worksheets are inappropriate for the activity, in which case applicants may substitute materials that provide equivalent information. These forms are found in the EPA guidance document entitled Interim Economic Guidance for Water Quality Standards: Workbook (EPA 823/B-95-002) (Economic Guidance). **Reasonable alternatives for the various activities include, but are not limited to the following actions.**

1. Alternatives for discharges include connection to an existing collection system, land application, water reuse, water recycling, **or other treatment alternatives.** For small domestic discharges, connection to an existing system or land application will be considered preferable.
2. **For water withdrawals, alternatives include water conservation, water reuse or recycling, off-stream impoundments, water harvesting during high flow conditions, regionalization, withdrawing water from a larger water body, use of ground water, connection to another water supply with available capacity, and pricing structures that encourage a reduction in consumption.**
3. **For activities that cause habitat alterations, alternatives that minimize or avoid degradation should be explored and explained by the applicant. These avoidance or minimization activities could include maintaining or enhancing buffer zones, bridging a stream rather than culverting it, altering the footprint of a project instead of relocating a stream, or using a culvert without a bottom, instead of one that is fully concreted.**

(b) For authorized new or expanded discharges, a record of the antidegradation determination(s) will be maintained and will be available for public review. Public

participation **and intergovernmental coordination** will be provided in conjunction with permitting activities.

Analysis of 1200-4-3-.06 Paragraph (3)

This Paragraph comprises the antidegradation statement for waters with available conditions, which represents a portion of the State's 40 CFR § 131.12(a)(2) waters. EPA's analysis of the new and revised provisions relating to *de minimis* determinations starts on page 35.

In the previous triennial review, Tennessee adopted an antidegradation statement for a category of waters having water quality levels for "substances or conditions not currently at or in violation of water quality standards." This category was renamed in the current triennial review as waters with available conditions, i.e., waters where "water quality is better than the applicable criterion for a specific parameter." Although the State's description of the category was revised, the methodology was left intact in the regulation in regard to proposed new or expanded point source discharges to this category of water bodies. We understand the State's intent in making these changes was to provide clarification in the regulation that high quality waters included waters within this category and that determinations concerning waters in this category were governed by a separate and distinct implementation methodology. In the State's Response to Public Comments, Tennessee stated:

Comment C-14: The names of the protection levels under the antidegradation policy should not be changed.

Response: We understand this comment, but feel that the old naming structure based on "tiers" led to a number of chronic misconceptions. The new system, while not perfect, at least goes in the direction of clearing up some of the confusion...

In 2003, the State adopted the following antidegradation decision process for addressing new or additional degradation due to point source discharges of "substances or conditions not currently at or in violation of water quality standards":

For substances or conditions not currently at or in violation of water quality standards, new or additional degradation will only be allowed if the applicant has demonstrated to the Department that reasonable alternatives to degradation are not feasible. Reasonable alternatives for discharges include, but are not limited to, connection to an existing collections system, land application, water reuse, or water recycling. For small domestic discharges, connection to an existing system or land application will be considered preferable.

The alternatives analysis shall be part of the application process and shall include a discussion of the feasibility, social and economic considerations, and environmental consequences of each potential alternative. Alternatives analyses shall include, at a minimum, completed and accurate Worksheets A and B for public sector applicants or Worksheets A and G for private system applicants, except where these worksheets are inappropriate for the activity, in

which case applicants may substitute materials that provide equivalent information. These forms are found in the EPA guidance document entitled Interim Economic Guidance for Water Quality Standards: Workbook (EPA 823/B-95-002) (Economic Guidance).

For authorized new or expanded discharges, a record of the antidegradation determination(s) will be maintained and will be available for public review. Public participation will be provided in conjunction with permitting activities.

EPA approved this provision on September 30, 2004.

The 2006 triennial review modifications to the provisions described above did not change the State's intent to include these waters, which are now called waters with available conditions, as waters addressed in 40 CFR § 131.12(a)(2) of the federal regulation. In the March 23, 2007 letter, the State addressed the federal antidegradation category of these waters, as follows:

Our protections for high quality waters are no less stringent than the federal requirements as demonstrated by the fact that the exact federal language found in 40 CFR 131.12(a)(2) is repeated in the first paragraph [1200-4-3-.06(1)]. The description of high quality waters given in that passage clearly applies to the category later described as Available Conditions [1200-4-3-.06(3)]. But to be clear about this, when a permit applicant seeks to degrade the high quality parameter(s) of Available Conditions waters, if we grant the application, we have made the determinations required by 1200-4-3-.06(1), including the determination that there is economic or social necessity for the degradation.

Following is a summary of the methodology applicable to this category of waters, as referenced in the State's currently approved standards, and how Tennessee has implemented this provision. For additional analysis of the relationship between the State's categories of waters with unavailable conditions and waters with available conditions, please see the discussion in "Analysis of 1200-4-3-.06 Paragraph (2)" starting on page 25.

The currently approved methodology states that if a water body has water quality that is better than the applicable water quality criteria, lowering of water quality will only be allowed in cases where the applicant has demonstrated to the Department of Environment and Conservation that "reasonable alternatives" to degradation are not feasible, taking into account the social and economic considerations and the environmental consequences of each project alternative.

This methodology represents a "pollutant-by-pollutant" approach to review of proposed lowering of water quality in waters addressed by 40 CFR § 131.12(a)(2), in that it applies to new or increased discharges of substances with water quality that is better than water quality criteria levels, regardless of whether or not the receiving water body is impaired due to the presence of other substances not present in the new or increased discharge. In the State's Response to Public Comments, Tennessee stated:

Comment K-5: The categories of streams that Tennessee has proposed calling "Unavailable Waters" and "Available Waters," should be combined and called "Water Quality Limited Streams."

Response: The change suggested by the commenter would require a change from the parameter-by-parameter approach established in 2003. Additionally, the change proposed by the commenter would dictate a “no degradation” requirement for all these streams, as degradation cannot be allowed in water quality limited streams.

Point Source Discharges to Waters with Available Conditions

The currently approved methodology for point source discharges to these waters requires information for each project alternative to be submitted by an applicant, and the information is required to be presented in the form of two worksheets from “Interim Economic Guidance for Water Quality Standards” (EPA-823-B-95-002, March 1995), or substitute materials in cases where these worksheets are inappropriate for the proposed activity. For both public and private sector applicants, the information on worksheets titled, “Pollution Control Project Summary Information,” and “Calculation of Total Annualized Project Costs,” is required as part of the application.

The information provided by the applicant is used by the Department of Environment and Conservation to determine whether the proposed activity complies with statement of antidegradation policy in 1200-4-3-.06(1) for waters qualifying for protection under 40 CFR § 131.12(a)(2). In the State’s Response to Public Comments, Tennessee stated:

Comment K-3: 1200-4-3-.06(1) suggests that the state must make a determination of social and economic need when authorizing degradation in water other than Exceptional Tennessee Waters. This should be clarified to indicate that such a determination is restricted to Exceptional Tennessee Waters.

Response: The proposed language in 1200-4-3-.06(1) is accurate. Where water quality exceeds the level needed to maintain uses, the state must make a determination that the change in water quality is in the public interest...

EPA concludes from this response and the statements made in the State’s March 23, 2007 letter that the State’s determination concerning proposed lowering of water quality, in a water in this category, includes analysis of important social and economic development in the area in which the water is located.

Since the State retained the implementation methodology in effect for waters with available conditions from the previous version of the water quality standards approved by EPA on September 30, 2004, EPA is not acting on that methodology as part of this CWA § 303(c) review. (Only the new and revised provisions submitted by the State are addressed in EPA’s CWA § 303(c) decision).

During the 2006 triennial review, the State added “other treatment alternatives” to the list of reasonable alternatives to be considered by applicants for new or expanded point source discharges to waters with available conditions. This adds flexibility for consideration of alternatives other than connection to an existing collection system, land application, water reuse, and water recycling on a case-by-case basis.

Water Withdrawals from Waters with Available Conditions

In 2006, the State also revised the antidegradation statement to specifically address potential degradation resulting from new water withdrawals by requiring a list of alternatives to be considered if a water withdrawal is proposed from a water body with available conditions. These alternatives include “water conservation, water reuse or recycling, off-stream impoundments, water harvesting during high flow conditions, regionalization, withdrawing water from a larger water body, use of ground water, connection to another water supply with available capacity, and pricing structures that encourage a reduction in consumption.” In the State’s Response to Public Comments, Tennessee described the rationale for including this list of alternatives:

Comment K-8: The list of potential alternatives for water withdrawals includes pricing structures that encourage water conservation. This is beyond TDEC’s authority to influence.

Response: The nexus to the department’s water-based authority is provided by the fact that measures that minimize the amount of withdrawal needed, such as pricing structures, among others, are part of showing the necessity of the activity.

We understand that the State’s decision to address water withdrawals in the methodology was based on the adoption of revisions to the criteria for “habitat” for the Fish and Wildlife designated use. 1200-4-3-.03(3)(n) was revised, as follows:

Habitat – The quality of instream habitat shall provide for the development of a diverse aquatic community that meets regionally-based biological integrity goals. **Types of habitat loss can include, but are not limited to: channel and substrate alterations, rock and gravel removal, stream flow changes, accumulation of silt, precipitation of metals, and removal of riparian vegetation. For wadeable streams,** the instream habitat within each subcoregion shall be generally similar to that found at reference streams. However, streams shall not be assessed as impacted by habitat loss if it has been demonstrated that the biological integrity goal has been met.

In the State’s Response to Public Comments, Tennessee described the basis for including flow as part of the revised criterion for habitat, as follows:

Comment G – 19: The biological integrity criterion should be modified to add that in addition to physical alterations, removal of water is an activity that can impact aquatic communities.

Response: We consider the removal of water to be a type of physical alteration. The new flow criterion in 1200-4-3-.03(3)(o) makes it clear that flows cannot be altered to the extent that fish and aquatic life criteria are not [no] longer met.

In the December 3, 2007 letter, EPA asked the State to provide details of the antidegradation evaluation process for water withdrawals. In that letter, EPA asked, “What types

of information or previous experiences in reviewing water withdrawal permits were used to establish levels of *de minimis* habitat alteration for activities that include water withdrawals?” In the February 27, 2008 letter, the State responded:

With regard to water withdrawals, the state considers the source stream’s resource value, the natural flow fluctuation characteristics of the source stream, the hydrologic requirements of aquatic ecosystems as well as the public value associated with the activity. The attached permit and notice of determination for the City of Franklin, Tennessee, water withdrawal permit provides an example of the state’s evaluation process.

Based on our review, the State’s response and the example permit and notice of determination provide insight into the process for review of proposed water withdrawals from waters with available conditions, as well as the State’s process to evaluate whether the proposed alteration due to a water withdrawal represents a *de minimis* change. The referenced notice of determination includes an alternatives analysis and an evaluation of social and economic considerations. Six different alternatives were considered, in addition to the alternative of an alternate water source for the City, i.e., no withdrawal. The selected alternative “would result in less degradation than the Harpeth River currently experiences and would not impair the river’s uses.” The factors considered in the State’s evaluation of social and economic considerations included the costs for treatment and delivery of potable water for the community and the benefits to the public health and welfare of a back-up water source. The State also evaluated projected effects to fish and wildlife, recreation activities, and the assimilative capacity of the river. The proposed project was subjected to public review and comment and the State reviewed all comments received during the permitting process prior to reaching a final determination on the proposed project. Also, the project, as permitted by the State, included several special conditions which serve to minimize water quality effects of the withdrawal, as well as investigate the feasibility of certain actions that could result in improving the overall water quality and habitat of the river and watershed.

Based on the information provided by the State, the antidegradation decision process for water withdrawals from waters with available conditions includes all of the components of a high quality antidegradation review. In making a determination as to whether a water withdrawal project complies with the State’s Antidegradation Statement, the decision process includes an evaluation of a comprehensive list of alternatives to determine whether the withdrawal is necessary, taking into account social and economic considerations of the alternatives, and the proposed State determination is subjected to public review and comment. Therefore, EPA finds that the new and revised provisions of 1200-4-3-.06 Paragraph (3) relating to water withdrawals are consistent with 40 CFR § 131.12(a)(2).

Habitat Alterations in Waters with Available Conditions

The State also revised the methodology in 1200-4-3-.06(3) to specifically address potential degradation resulting from new habitat alterations by requiring a list of alternatives that minimize or avoid degradation that are to be evaluated for activities that may cause habitat alterations. These alternatives include “maintaining or enhancing buffer zones, bridging a stream

rather than culverting it, altering the footprint of a project instead of relocating a stream, or using a culvert without a bottom, instead of one that is fully concreted.”

EPA, in the December 3, 2007 letter to the State, EPA requested that the State provide information that would provide details of how an antidegradation decision process is conducted for habitat alterations. The State responded, “The state allows some habitat alterations that are considered to be greater than *de minimis*. In these cases, the state compares the resource value to the socioeconomic benefit associated with the alteration when considering authorization of the activity. Previously this process included an alternatives analysis, but the new standards will result in a more robust analysis. An example of such an evaluation is attached.”

The attachment to the State’s February 27, 2008 letter provided an example of the CWA water quality certification issued by the State for an ARAP permit that was issued for a railway crossing of the Hatchie River in Lauderdale County. At the point of the crossing, the Hatchie River was a high quality (tier II) water under Tennessee’s antidegradation classification system as approved by EPA on September 30, 2004. (This name of this category was subsequently revised during the 2006 triennial review to the Exceptional Tennessee Waters category.) The certification was issued for the Canadian National crossing of the Hatchie River in Lauderdale County. In that certification, the State addressed the process used to determine compliance with the antidegradation statement. EPA understands that this water quality certification was offered by the State as representing the State’s process in instances “involving habitat alteration in cases where the impacts may be considered to be greater than *de minimis*.” Therefore, the process used by the State in this instance should represent the process for evaluation of habitat alterations in waters with available conditions. (See discussion of Exceptional Tennessee Waters starting on page 48.) The State, in the Notice of Determination, stated the following:

Antidegradation regulations prohibit degradation in waters identified by the Department as Tier II high quality unless and until it is affirmatively demonstrated to the Department, after full satisfaction of intergovernmental and public participation provisions, that a change is justified as a result of necessary economic or social development and will not interfere with or become injurious to any classified uses existing in such waters.

The Hatchie River is identified as high quality (tier 2) waters from an upstream point at the Mississippi state line downstream to its confluence with the Mississippi River. The basis for inclusion of the Hatchie River as high quality includes the following: it is designated as a Class I National Wildlife Refuge and Lower Hatchie National Wildlife Refuge; is the last major un-channelized river in West Tennessee and is habitat for the state threatened Blue Sucker (*Cycleptus elongates*).

The department has identified the flood plain wetlands immediately adjacent to the Hatchie River at the railway crossing as high quality tier 2. The drainage area in the segment in the watershed of the Hatchie River at the railway crossing is 2,308 square miles. The floodplain is relative narrow and contained; it is characterized by frequently inundated wetlands resulting from out of bank flooding of relatively long duration.

Antidegradation regulations require the department to hold a public meeting when an applicant proposes to seek a permit to degrade high quality tier 2 waters. That public meeting was held near the project site in Covington on February 21, 2006.

These rules require that if the department determines that degradation is justified, it will notify the applicant, the federal and state intergovernmental coordination agencies, and third persons who requested notification of the determination. In this case the department determined that the degradation of these wetlands was justified (see comment # 4). This determination was announced in a public notice on June 7, 2006. A second public hearing on the permit proposal was held on February 1, 2007, also in Covington.

In responding to the comment, “The Hatchie River is designated as high quality tier 2 under the Tennessee Antidegradation Statement. Antidegradation regulations prohibit degradation in waters identified by the department as Tier 2 high quality unless the degradation is socially and economically justified, the State responded:

In June of 2006, the division issued a Notice of Determination of Economic/Social Necessity for this project. The notice announced that the division had determined that the change is justified as a result of necessary economic or social development and will not interfere with or become injurious to any classified uses existing in the affected waters. This determination was based upon the division consideration that the cost of the alternative is significantly greater than that associated with the preferred action and that the alternative does not provide sufficiently greater environmental benefit to justify the additional cost.

In making this determination, Tennessee took into consideration the projected cost for two alternatives to the project that was ultimately certified by the State, as well as other factors. These factors included an analysis of whether the Hatchie River is vulnerable to incremental adverse environmental effects, other possible similar actions in the watershed that would have similar effect as the project under review, as well as historical impacts to the watershed. The State also evaluated analyzed the potential effects to the scenic, recreational, geological, fish and wildlife and other scientific and cultural values of the river and watershed for each of the alternatives.

Based on a review of the new regulatory provisions of Paragraph (3) of 1200-4-3-.06 that implement the Tennessee antidegradation statement for habitat alterations in waters with available conditions, in conjunction with the certification issued by the State for the Hatchie River, it is clear that the State’s review for these activities addresses all of the components of a high quality antidegradation review.

Public Participation and Intergovernmental Coordination

The State also modified the statement that outlined the process for public participation in the implementation of the methodology for waters with available conditions. Subparagraph (3)(b) now states, “Public participation **and intergovernmental coordination** will be provided in conjunction with permitting activities.” This statement was added to be consistent with the

reference to intergovernmental coordination in 40 CFR § 131.12(a)(2). This revision makes it clear that any coordination between governmental agencies will be conducted during the permitting process for any proposed activity that could result in “new or additional degradation” in these water bodies.

For the reasons stated above, EPA finds that the new and revised provisions of 1200-4-3-.06 Paragraph (3) are consistent with 40 CFR § 131.12(a)(2).

Analysis of *De minimis* Determinations

Proposed activities may be considered to have impacts that are *de minimis*. The State’s standards previously included a reference to *de minimis* impact, referenced as a part of the definition of what did, and did not, constitute degradation. With this triennial revision, the State has included a separate definition for the term *de minimis*. 1200-4-3-.04(3) and (4) now define degradation and *de minimis* as:

(3) Degradation – The alteration of the properties of waters by the addition of pollutants or removal of habitat.

(4) *De Minimis* - Alterations other than those resulting in the condition of pollution or new domestic wastewater discharges, that represent either a small magnitude or a short duration shall be considered a *de minimis* impact and will not be considered degradation for purposes of implementing the antidegradation policy. Discharges other than domestic wastewater will be considered *de minimis* if they are temporary or use less than five percent of the available assimilative capacity for the substance being discharged. Water withdrawals will be considered *de minimis* if less than five percent of the 7Q10 flow of the stream is removed (the calculations of the low flow shall take into account existing withdrawals). Habitat alterations authorized by an Aquatic Resource Alteration Permit (ARAP) are *de minimis* if the division finds that the impacts are offset by a combination of impact minimization and/or in-system mitigation.

If more than one activity has been authorized in a segment and the total of the impacts uses no more than ten percent of the assimilative capacity, available habitat, or 7Q10 low flow, they are presumed to be *de minimis*. Where total impacts use more than ten percent of the assimilative capacity, available habitat, or 7Q10 low flow they may be treated as *de minimis* provided that the division finds on a scientific basis that the additional degradation has an insignificant effect on the resource and that no single activity is allowed to consume more than five percent of the assimilative capacity, available habitat or 7Q10 low flow.

Subparagraph (4) of 1200-4-3-.04 defines *de minimis* degradation, but also excludes certain types of alterations from ever being considered as *de minimis* degradation. First, it excludes any alteration that results in “the condition of pollution” from being *de minimis*. Pollution is defined in the State’s permitting regulations, at 1200-4-5-.02(69), as follows:

Pollution means such alteration of the physical, chemical, biological, bacteriological, or radiological properties of the waters of this state, including, but not limited to, changes in temperature, taste, color, turbidity, or odor of the waters that will: (a) Result or will likely result in harm, potential harm or detriment of the public health, safety, or welfare; (b) Result or will likely result in harm, potential harm or detriment to the health of animals, birds, fish and aquatic life; (c) Render or will likely render the waters substantially less useful for domestic, municipal, industrial, agricultural, recreational, or other reasonable uses; or (d) Leave or likely leave the waters in such condition as to violate any standards of water quality established by the board.

Therefore, any alteration of a water body that results in any of those conditions cannot be considered as *de minimis*, regardless of how small the alteration may be, but rather a part of the category of activities that result in degradation. That category also includes activities that do not result in pollution, but are not considered *de minimis*. The state then describes/defines those activities that may be considered *de minimis*, among them point source discharges, water withdrawals and habitat alterations.

***De minimis* Determinations – Point Source Discharges**

Subparagraph (4) of 1200-4-3-.04 also excludes from consideration as *de minimis* the degradation/alteration that will occur due to a new domestic discharge. Alterations of water quality due to a new domestic discharge cannot be considered as *de minimis*, regardless of how small the amount of degradation projected to occur.

Any other alteration proposed by a point source discharge could be considered as *de minimis* if it meets the other conditions in the definition in 1200-4-3-.04(4). In the State's Response to Public Comments, Tennessee described the intent of the *de minimis* provision, as follows:

Comment I-8: The definition of degradation contains a provision for *de [minimis]* impacts. This is objectionable as no amount of degradation should be allowed in Tennessee's high quality waters.

Response: The concept of *de [minimis]* degradation is needed for those occasions in which the amount of additional loading of a substance, the loss of habitat, or a water withdrawal is so small that it is more theoretical, rather than measurable degradation.

Comment I-15: Who is the decider concerning what is a *de minimis* level of degradation?

Response: The department makes a determination regarding *de minimis* at the time a request for authorization for an activity is received. Activities ruled to be *de minimis* do not go through a full antidegradation review. Like any other permitting action, *de minimis* calls can be appealed.

As described above, the State's methodology for addressing point sources of "substances or conditions not currently at or in violation of water quality standards" was adopted by the State in the previous triennial review and approved by EPA on September 30, 2004. Due to the

provision for *de minimis* in the definition of “degradation” in place at that time, that methodology stated that water quality alterations due to point source discharges that are of a temporary nature or those alterations having no measurable or less than five percent loss of assimilative capacity were not considered as “degradation,” and, therefore, not subject to the socio-economic and alternative review provisions of the methodology. The version of the methodology adopted by the State during the 2006 triennial review for waters with available conditions, by including the phrase “new or additional degradation,” requires a determination as to whether the impacts of a proposed activity constitute “degradation” or are considered to be *de minimis*. The State retained the provisions for consideration of temporary alterations and alterations from point source discharges which result in the loss of less than five percent of assimilative capacity as representing a *de minimis* level of degradation in these waters. The 2006 revisions to the State’s standards involving these terms also expanded the definition of *de minimis* to include provisions establishing that point source discharges that use less than five percent of the available assimilative capacity for a pollutant.

EPA has accepted the inclusion of the “significance” concept in State and Tribal antidegradation implementation methodologies. In a memorandum, dated August 10, 2005, from Ephraim S. King, Director of the Office of Science and Technology, to EPA Regional Water Management Division Directors, EPA stated:

We recognize that some states and tribes have chosen to target their antidegradation efforts by defining a significance threshold above which the effects on water quality require tier 2 antidegradation findings of necessity and social and economic importance. Applying antidegradation review requirements only to those activities that may result in significant degradation of water quality is a useful approach that allows states and tribes to focus their resources where they may result in the greatest environmental protection. However, it is important that states and tribes set their significance thresholds at a level that can be demonstrated to be consistent with the purpose of tier 2 antidegradation requirements. Otherwise, a new or increased discharge may result in significant degradation that will not be subject to antidegradation review, and decisions about the lowering of water quality in high quality waters may be made without public consideration of necessity and importance, resulting in the loss or diminishment of a valuable natural resource.

Based on a review of different approaches taken by the states and tribes, the memorandum recommended that, if the concept of a threshold was included in a state’s or tribe’s antidegradation methodology, that “the most appropriate way to define a significance threshold is in terms of assimilative capacity.” The memorandum also discussed this concept in relation to the development of the Water Quality Guidance for the Great Lakes:

Relying upon input offered during a four-year open public process involving environmental groups, industry representatives, and other experts, with numerous opportunities for public input, the directors of the eight Great Lakes states and EPA technical experts reached a consensus on a significance threshold value of ten percent (10%) of the available assimilative capacity, coupled with a cumulative cap... They believed that any individual decision to lower water quality for non-BCCs that is limited to 10% of the available assimilative capacity

represents minimal risk to the receiving water and is fully consistent with the objectives and goals of the Clean Water Act.

The memorandum also stated:

To address where there are multiple or repeated increases in discharges, OST recommends that states and tribes incorporate a cumulative cap on the use of total assimilative capacity (i.e., the baseline assimilative capacity of a water body established at a specified point in time.) This approach creates a backstop so that multiple or repeated discharges to a water body over time do not result in the majority of the total assimilative capacity being used with a single antidegradation review. For instance, the state or tribe may choose to subject any lowering of water quality to antidegradation review after a certain percentage of the total assimilative capacity has been used. This ensures that where the ambient water quality is lowered closer to the criteria levels, the state or tribe will conduct an antidegradation review after a certain point to evaluate the necessity and importance of each lowering, regardless of the amount of assimilative capacity that would be used.

Tennessee, in adopting a methodology for point source discharges of “substances or conditions not currently at or in violation of water quality standards” (that was approved by EPA on September 30, 2004), specified that the *de minimis* threshold was five percent of assimilative capacity of the receiving stream. This provision was retained in the 2006 triennial review of Tennessee standards. The standards approved by EPA on September 30, 2004, also included a provision for point sources that if a substantial loss of assimilative capacity, defined as fifty percent, has already occurred, then no degradation was considered as being *de minimis*. This provision was revised during the 2006 triennial review to require the following:

If more than one activity has been authorized in a segment and the total of the impacts uses no more than ten percent of the assimilative capacity, ... they are presumed to be *de minimis*. Where total impacts use more than ten percent of the assimilative capacity, ... they may be treated as *de minimis* provided that the division finds on a scientific basis that the additional degradation has an insignificant effect on the resource and that no single activity is allowed to consume more than five percent of the assimilative capacity...

The provisions applying the concept of a significance threshold to point sources in Tennessee are consistent with EPA’s August 10, 2005 memorandum on the inclusion of significance thresholds in state and tribal water quality standards, as the threshold is based on five percent for an individual activity and ten percent for cumulative degradation. Also, it is reasonable for the State to also include some flexibility in the provisions for cumulative degradation, by allowing a scientific analysis of degradation over and above the ten percent cumulative *de minimis* level in a determination by the Division of Water that additional degradation has “an insignificant effect on the resource” for activities that will use less than five

percent of the assimilative capacity of the water body. In the State's Response to Public Comments, Tennessee described the basis for inclusion of this provision:

Comment I-9: Any additional degradation above the ten percent cumulative cap should never be considered *de minimis*.

Response: While we generally agree, we feel that there might be occasions in which a very small additional amount of degradation above the ten percent cap might be justified as *de minimis*.

Comment I-6: The cap on any individual application of the *de minimis* should be set at 20 percent.

Response: We consider 20 percent too great a loss of assimilative capacity to be considered insignificant.

Given Tennessee's statements that this flexibility should be limited to circumstances where "a very small additional amount of degradation above the ten percent cap," and that twenty per cent of assimilative capacity is "too great a loss of assimilative capacity to be considered insignificant," the State's approach in retaining some flexibility is in line with the intent of EPA's statements on inclusion of cumulative caps for significance thresholds in antidegradation implementation methodologies. As described above, EPA has stated that inclusion of a cumulative cap addresses the possibility of "multiple or repeated increases in discharges," in order to "create(s) a backstop so that multiple or repeated discharges to a water body over time do(es) not result in the majority of the total assimilative capacity being used with a single antidegradation review." It is clear that the State does not intend to use the flexibility afforded by the provision to avoid an antidegradation review for an activity that would result in a significant lowering of water quality, and the State would allow the use of only a "very small" percentage of the assimilative capacity of the water body above the cumulative cap, and, in no cases, would allow the use of all of the assimilative capacity of the water body without conducting an antidegradation review.

The State, in responding to questions posed by EPA, has clarified its position in terms of consideration of the *de minimis* provisions for proposed new or expanded discharges to waters with unavailable conditions. The *de minimis* provisions of 1200-4-3-.04 Paragraphs (3) and (4) that address point sources do not apply to the waters addressed by the provisions of 1200-4-3-.06 Paragraph (2), i.e., waters with unavailable conditions.

Based on our review, EPA finds that this process, as represented by the State as assuring a *de minimis* level of degradation for point source discharges, is consistent with 40 CFR § 131.12.

***De minimis* Determinations - Water Withdrawals**

The State's process for allowing a *de minimis* level of degradation for water withdrawals includes a restriction that less than five percent of the 7Q10 flow of a water body is removed. The calculations of flow must take into account existing withdrawals.

In the December 3, 2007 letter, EPA asked the State to provide details of this part of the antidegradation evaluation process for water withdrawals. In that letter, EPA asked, "What types of information or previous experiences in reviewing water withdrawal permits were used to establish levels of *de minimis* habitat alteration for activities that include water withdrawals? In the February 27, 2008 letter, the State responded:

With regard to water withdrawals, the state considers the source stream's resource value, the natural flow fluctuation characteristics of the source stream, the hydrologic requirements of aquatic ecosystems as well as the public value associated with the activity. The attached permit and notice of determination for the City of Franklin, Tennessee, water withdrawal permit provides an example of the state's evaluation process.

The referenced notice of determination involves a proposal to increase a water withdrawal for the City of Franklin from the Harpeth River. The Harpeth River was identified on Tennessee's CWA section 303(d) list as a water quality limited segment, and a Total Maximum Daily Load was established on September 28, 2004, to address impairment by organic enrichment/low dissolved oxygen. Under the current categorization of Tennessee waters, the Harpeth River would be considered to have unavailable conditions for organic enrichment and dissolved oxygen.

The State required an alternatives analysis of six different withdrawal alternatives, in addition to the alternative of an alternate water source for the City, i.e., no withdrawal. The State also required an evaluation of social and economic considerations, including the costs for treatment and delivery of potable water for the community and the benefits to the public health and welfare of a back-up water source. The State also evaluated projected effects to fish and wildlife, recreation activities, and the assimilative capacity of the river in order to assure that the project authorized would have minimal effects on water quality. The proposed project was subjected to public review and comment and the State reviewed all comments received during the permitting process prior to reaching a final determination on the proposed project. The alternative authorized by the permit issued by the State will "result in less degradation than the Harpeth River currently experiences and would not impair the river's uses." Also, the project, as permitted by the State, included several special conditions which serve to minimize water quality effects of the withdrawal, as well as investigate the feasibility of certain actions that could result in improving the overall water quality and habitat of the river and watershed. This specific example of the State's application of this provision did not explicitly involve the calculation of the percentage of the Harpeth River's 7Q10 flow. Also, it did involve a review of alternatives and social and economic considerations. EPA nonetheless considers the State's explanation of this case as representative of the State's intent in determinations of *de minimis* degradation for water withdrawals.

Paragraph (4) 1200-4-3-.04 also includes a cumulative cap applied in cases where more than one water withdrawal activity has been permitted, and the total impact uses no more than ten percent of the 7Q10 flow of the water body. However, this provision allows exceptions to the cumulative cap if there is a scientific basis that the additional degradation associated with a proposed water withdrawal activity has an insignificant effect on the resource. In its February 27, 2008 letter to EPA, the State provided the following information with respect to this provision:

As with cases where 10 % of the assimilative capacity or 7Q10 has been used, a *de minimis* determination could be made if the impact of the additional discharge, habitat loss, or water withdrawal was shown by modeling, mass balance, or other scientific method to be too small to be measured. *De minimis* determinations will be part of the permit record. ... The material for review at that time would include the permit application and the state's preliminary *de minimis* determination. For those permits, the public would have an opportunity to review and object to (via 3rd party appeal rights), the *de minimis* determinations during the 30 days subsequent to permit issuance.

EPA's August 10, 2005 memorandum discussed above focused on degradation from point source discharges to waters addressed by 40 CFR § 131.12(a)(2), i.e., high quality waters. However the same rationale for including the significance threshold concept in a state or tribal antidegradation implementation methodology can be made for other types of activities that can lower water quality in high quality waters. As stated above, EPA determined that a significance threshold is useful, as it allows "states and tribes to focus their resources where they may result in the greatest environmental protection." Tennessee has chosen to include significance thresholds for water withdrawals and other activities that alter habitat.

In the State's Response to Public Comments, Tennessee described how the *de minimis* provision for water withdrawals will be implemented:

Comment I-11: Regarding the provisions dealing with water withdrawals in the definition of *de minimis*, the 5 percent cap on individual withdrawals should be based on average withdrawal rates. Also, a greater than 5 percent withdrawal should be treated as *de minimis* if the water is returned.

Response: We believe that the *de minimis* cap should be based on the maximum withdrawal rates. A 5 percent average might be accomplished by withdrawing considerably more than 5 percent for some period of time, then balancing it with lower rates. Also, the department must make the determination based on what is being authorized, which is the maximum.

Regarding withdrawals that are returned to the stream, we believe that the current definition already gives us the flexibility to consider this. However, we note that in some streams, there may be some distance between a withdrawal point and the return point. In this dewatered section of stream, the effect would have to be considered and might not be *de minimis*.

Also, as previously discussed in relation to the State's significance threshold, Tennessee's stated intent is to limit the amount of degradation that is considered to be *de minimis* to the extent that it "is so small that it is more theoretical, rather than measurable degradation."

In EPA's December 3, 2007 letter, EPA asked the State for clarification on possible water withdrawals in waters with unavailable conditions. In that letter, EPA asked, "Are there any conditions that would allow for proposed water withdrawals from water bodies with unavailable conditions, e.g., an allowance for additional *de minimis* withdrawals?" In the February 27, 2008 letter, the State responded, "In the case of water withdrawals, the division will consider whether or not the withdrawal will have any impact on the cause of impairment for waters with unavailable conditions. For example, a withdrawal may not have any effect on a water that is impaired for a particular pollutant. In that case, the withdrawal would not be considered *de minimis*, but more like a situation where a discharge of one pollutant could be allowed in a water impaired for another pollutant. In other words, water withdrawals could be allowed in these waters, but only in cases where the withdrawal would not result in the lowering of water quality."

Given Tennessee's statements that describe the rationale for the cumulative *de minimis* cap for water withdrawals, it is clear that the State does not intend to use the flexibility afforded by the provision to avoid an antidegradation review for an activity that would result in a significant lowering of water quality. In fact, the State could not make an additional *de minimis* determination in cases where 10 percent of the 7Q10 flow has been used, unless "the impact of the additional ... water withdrawal was shown by modeling, mass balance, or other scientific method to be too small to be measured."

Based on our review, EPA finds that this process, as represented by the State as assuring a *de minimis* level of degradation for water withdrawals, is consistent with 40 CFR § 131.12.

***De minimis* Determinations – Habitat Alterations**

The *de minimis* provisions of Paragraph 4 of 1200-4-3-.04 also apply to habitat alterations. Habitat alterations are considered as *de minimis* "if the division finds that the impacts are offset by a combination of impact minimization and/or in-system mitigation." Habitat alterations can also be offset to a *de minimis* level in waters with unavailable conditions if the habitat alteration is offset using avoidance techniques as well as impact minimization and/or in-system mitigation.. This *de minimis* provision in 1200-4-3-.04(4) also states, "If more than one activity has been authorized in a segment and the total of the impacts uses not more than ten percent of the ... available habitat, ... they are presumed to be *de minimis*. Where total impacts use more than ten percent of the ... habitat, ... they may be treated as *de minimis* provided that the division finds on a scientific basis that the additional degradation has an insignificant effect on the resource and that no single activity is allowed to consume more than five percent of the ... habitat."

In the State's Response to Public Comments, Tennessee described the intent of the *de minimis* provision, as follows:

Comment I-8: The definition of degradation contains a provision for *de [minimis]* impacts. This is objectionable as no amount of degradation should be allowed in Tennessee's high quality waters.

Response: The concept of *de [minimis]* degradation is needed for those occasions in which ... the loss of habitat ... is so small that it is more theoretical, rather than measurable degradation.

Tennessee's regulations require that a physical alteration to a stream, river, lake or wetland must be authorized by an Aquatic Resource Alteration Permit (ARAP). The ARAP program addresses the alteration of properties of waters of the State resulting from activities other than discharges of wastewater through a pipe, ditch or other conveyance. Examples of stream alterations that require a permit from the Tennessee Division of Water Pollution Control include: dredging, excavation, channel widening, or straightening; bank sloping; stabilization; channel relocation; water diversions or withdrawals; installation of dams, weirs, dykes, levees or other similar structures; flooding, excavating, draining and/or filling a wetland; construction of road and utility crossings; and placement of structural fill. Rules governing the ARAP program require that persons who propose activities that may impact habitat consider avoidance and minimization of such impacts. If impacts are projected to occur during the activity, mitigation must offset any lost resource value.

A federal permit may also be required from the U. S. Army Corps of Engineers (the Corps) for projects that include the discharge of dredged or fill material into waters of the United States. When a CWA § 404 is required from the Corps, a CWA § 401 certification must first be obtained from the Tennessee Division of Water Pollution Control, unless Tennessee fails to act within a reasonable period of time not to exceed one year. A CWA § 401 certification affirms that the discharge will comply with, among other things, Tennessee's water quality standards, including the State's Antidegradation Statement in 1200-4-3-.06. The application process for a CWA § 401 certification is the same as the ARAP process.

EPA has provided limited guidance regarding the application of existing use protection in relation to habitat alterations. However EPA did address implementation of 40 CFR § 131.12(a)(1) requirements regarding CWA § 404 in the document, "Questions and Answers: Antidegradation," USEPA, August 1985. In that document, EPA stated:

Since a literal interpretation of the antidegradation policy could result in preventing the issuance of any wetland fill permit under Section 404 of the Clean Water Act, and it is logical to assume that Congress intended some such permits to be granted within the framework of the Act, EPA interprets § 131.12(a)(1) of the antidegradation policy to be satisfied with regard to fills in wetlands if the discharge did not result in "significant degradation" to the aquatic ecosystem as defined under Section 230.10(c) of the Section 404(b)(1) guidelines.

The above answer explains EPA's view that Tier 1 of antidegradation is satisfied if there is no significant degradation in connection with a proposed Section 404 activity. EPA understands that the State is applying this concept of no significant degradation to State ARAP projects that

occur in “the same area of influence” of a previous habitat alteration, through the reference in Paragraph (2) to impacts that are *de minimis*.

Therefore, the compensation of habitat alteration through equivalent impact minimization and/or in-system mitigation in waters with unavailable conditions is consistent with the requirements of 40 CFR § 131.12(a)(1), as it results in no net loss of existing uses for the water body in the “same area of influence” or the previous habitat alteration, based on the State’s explanation of the use of the term *de minimis*. The State has placed an additional restriction on projects that result in an appreciable permanent loss of resource values of waters in that only in-system mitigation can be used to compensate for impacts in regulated areas.

EPA, in the December 3, 2007 letter, asked that the State clarify how *de minimis* determinations are made for habitat alterations. Tennessee, in the February 27, 2008 letter responded, as follows:

Tennessee rules require that any applicant evaluate alternatives such as in-system mitigation and avoidance which could render the degradation *de minimis* in effect. The applicant’s evaluations must consider the resource value and the incremental socioeconomic impact associated with any additional project costs that result from non-degrading alternatives.

When evaluating applications for physical alterations in streams with available conditions or in Exceptional Tennessee Waters, the state will use the area of impact and activity type as a basis for determining whether the activity will consume more than 5 % of the available habitat. We will evaluate whether the stream has already reached or exceeded the cumulative *de minimis* cap (10%) with a combination of tools such as direct measurements, GIS, databases of previously permitted activities, computer models, remote sensing (aerial photographs or satellite imagery), plus knowledge of the watershed. As with cases where 10 % of the assimilative capacity or 7Q10 has been used, a *de minimis* determination could be made if the impact of the additional discharge, habitat loss, or water withdrawal was shown by modeling, mass balance, or other scientific method to be too small to be measured. *De minimis* determinations will be part of the permit record. ... For ARAP permits, the public notice process occurs upon receipt of a complete permit application and prior to development of a draft permit. The material for review at that time would include the permit application and the state’s preliminary *de minimis* determination. For those permits, the public would have an opportunity to review and object to (via 3rd party appeal rights), the *de minimis* determinations during the 30 days subsequent to permit issuance.

EPA’s August 10, 2005 memorandum focused on degradation from point source discharges to waters addressed by 40 CFR § 131.12(a)(2), i.e., high quality waters. However the same rationale for including the significance threshold concept in a state or tribal antidegradation implementation methodology can be made for other types of activities that can lower water quality in high quality waters. As stated above, EPA determined that a significance threshold is useful, as it allows “states and tribes to focus their resources where they may result in the greatest environmental protection.” Tennessee has chosen to include significance thresholds for

water withdrawals and activities that alter habitat. EPA believes that the compensation of impact minimization and/or in-system mitigation can achieve the same purpose as other more traditional *de minimis* thresholds as it can result in a project not having a significant effect on the habitat in the water body.

Tennessee also adopted a provision that allows the Division of Water to determine that a habitat alteration is *de minimis* if the habitat impacts “are offset by a combination of impact minimization and/or in-system mitigation.” In the State’s Response to Public Comments, Tennessee described the basis for including a significance threshold for habitat impacts, as follows:

Comment I-12: The definition of *de minimis* should specify that in addition to in-system mitigation, out-of-system mitigation or the purchase of mitigation credits can also represent *de minimis* conditions.

Response: The department’s position and that of recent court decisions is that out-of-system mitigation or the purchase of mitigation credits do not render an activity *de minimis*. Only in-system mitigation addresses the impacts to the waters where the degradation is being authorized.

Also, as previously discussed in relation to the State’s significance threshold for point source discharges and water withdrawals, Tennessee’s stated intent is to limit the amount of degradation that is considered to be *de minimis* to the extent that it “is so small that it is more theoretical, rather than measurable degradation,” as well as, “we feel that there might be occasions in which a very small additional amount of degradation above the ten percent cap might be justified as *de minimis*.”

In the December 3, 2007 letter, EPA asked that the State clarify the provision in 1200-4-3-.06 Paragraph (2) which applies to *de minimis* habitat alterations in waters with unavailable conditions, which states:

Where impairment by habitat alteration exists, additional significant loss of habitat within the same area of influence shall not be authorized unless avoidance, minimization, or in-system mitigation can render the impact *de minimis*.

In the December 3, 2007 letter, EPA stated, “Based on discussions with your staff, we understand that the inclusion of the word “significant” in this sentence was intended to mean the loss of habitat that occurs above and beyond a *de minimis* level of habitat loss. I ask that you confirm that interpretation or provide additional details as to the intent of the term as used here.” In the February 27, 2008 letter, the State responded, “In the context of habitat impairment, the state would not authorize an activity beyond *de minimis*.”

Paragraph (4) 1200-4-3-.04 also includes a cumulative cap applied in cases where more than one physical alteration activity has been permitted, and the total impact uses no more than ten percent of the available habitat of the water body. However, this provision allows exceptions to the cumulative cap if there is a scientific basis that the additional degradation associated with a

proposed physical alteration has an insignificant effect on the resource. In its February 27, 2008 letter to EPA, the State provided the following information with respect to this provision:

We will evaluate whether the stream has already reached or exceeded the cumulative *de minimis* cap (10%) with a combination of tools such as direct measurements, GIS, databases of previously permitted activities, computer models, remote sensing (aerial photographs or satellite imagery), plus knowledge of the watershed. As with cases where 10 % of the assimilative capacity or 7Q10 has been used, a *de minimis* determination could be made if the impact of the additional discharge, habitat loss, or water withdrawal was shown by modeling, mass balance, or other scientific method to be too small to be measured.

Given Tennessee's statements that describe the rationale for the cumulative *de minimis* cap for habitat alterations, as well as other statements in regard to the cumulative cap for point sources and water withdrawals discussed above, it is clear that the State does not intend to use the flexibility afforded by the provision to avoid an antidegradation review for a habitat alteration activity that would result in a significant lowering of water quality. In fact, the State could not make an additional *de minimis* determination unless "the impact of the additional ... habitat loss was shown by modeling, mass balance, or other scientific method to be too small to be measured."

Also, in the February 27, 2008 letter, Tennessee stated the following:

De minimis determinations will be part of the permit record. For NPDES permits, the public will have the opportunity to review the determinations during the public comment period. For ARAP permits, the public notice process occurs upon receipt of a complete permit application and prior to development of a draft permit. The material for review at that time would include the permit application and the state's preliminary *de minimis* determination. For those permits, the public would have an opportunity to review and object to (via 3rd party appeal rights), the *de minimis* determinations during the 30 days subsequent to permit issuance.

This comprises a summary of the State's public participation provisions as they relate to *de minimis* determinations for habitat alterations.

Based on our review, EPA finds that this process, as represented by the State as assuring a *de minimis* level of degradation for habitat alterations, is consistent with 40 CFR § 131.12.

1200-4-3-.06 Paragraph (4)

Paragraph (4) was added as the selection criteria and antidegradation statement for Exceptional Tennessee Waters. Subparagraph (4)(a) replaces the category and selection criteria in Subparagraph (2)(a) through (d) for Tier II high quality waters as adopted by the State and approved by EPA on September 30, 2004. Subparagraph (4)(b) was added to inform the public of the availability of the list of waters qualifying as Exceptional Tennessee Waters. Also, minor revisions were made to the antidegradation statement for the previous Tier II high quality waters.

This methodology (which now applies to Exceptional Tennessee Waters) is contained in Subparagraphs (4)(c), (d), (e), (f) and (g).

1200-4-3-.06 Subparagraph (4)(a)

Exceptional Tennessee Waters are waters that are in any one of the following categories:

- 1. Waters within state or national parks, wildlife refuges, forests, wilderness areas, or natural areas;**
- 2. State Scenic Rivers or Federal Wild and Scenic Rivers;**
- 3. Federally-designated critical habitat or other waters with documented non-experimental populations of state or federally-listed threatened or endangered aquatic or semi-aquatic plants, or aquatic animals;**
- 4. Waters within areas designated as Lands Unsuitable for Mining pursuant to the federal Surface Mining Control and Reclamation Act where such designation is based in whole or in part on impacts to water resource values;**
- 5. Waters with naturally reproducing trout;**
- 6. Waters with exceptional biological diversity as evidenced by a score of 40 or 42 on the Tennessee Macroinvertebrate Index (or a score of 28 or 30 in subcoregion 73a) using protocols found in TDEC's 2006 Quality System Standard Operating Procedure for Macroinvertebrate Stream Surveys, provided that the sample is considered representative of overall stream conditions; or**
- 7. Other waters with outstanding ecological, or recreational value as determined by the department. When application of this provision is a result of a request for a permit, such preliminary determination is to be made within 30 days of receipt of a complete permit application.**

Analysis of 1200-4-3-.06 Subparagraph (4)(a)

In the State's Response to Public Comments, Tennessee stated:

Comment C-2: The antidegradation policy should not be revised in such a way to make it more stringent.

Response: We have proposed a set of revisions that adds clarification to the procedures staff use to determine which category a stream goes into for purposes of antidegradation implementation. Some of the changes to the characteristics for Exceptional Tennessee Waters increase the number of streams fitting into the category over those that were Tier II in the existing rules, but other changes have the opposite effect. We do not anticipate a

significant change overall. Additionally, we have maintained the protection strategy for each category at the existing levels.

A state's antidegradation implementation methodology should address the appropriate waters, i.e., EPA's high quality waters, and ensure that these waters receive an appropriate level of review that is consistent with the provisions of 40 CFR § 131.12(a)(2). Tennessee has chosen to include waters with available conditions and Exceptional Tennessee Waters as 40 CFR § 131.12(a)(2) waters in the State, and has included separate implementation procedures requiring a high quality waters decision process for each. Waters with available conditions include waters with water quality that is "better than the applicable criterion for a specific parameter," unless a water body or water body segment qualifies for protection under the Exceptional Tennessee Waters category. EPA previously approved the category of waters characterized in Tennessee's standards as "not currently at or in violation of water quality standards." Moreover, EPA previously approved the selection criteria and protection strategy for the State's Tier II high quality waters, in conjunction with the selection criteria and protection strategy for waters with "substances or conditions not currently at or in violation of water quality standards," as being consistent with 40 CFR § 131.12(a)(2). Accordingly, both categories, although renamed in the current submittal, have been a part of the State's approved standards.

The selection criteria for Exceptional Tennessee Waters include several aspects that are usually associated with "high" water quality levels (i.e., water quality levels that are better than necessary for CWA § 101(a)(2) uses), such as waters with ecologically important or "exceptional" habitat; coldwater fisheries; or waters found to have an outstanding "recreational or ecological value." However, these selection criteria also include other features that may have no direct link to high levels of water quality, such as waters included within boundaries of federal or state protected areas, as well as waters with outstanding scenic value. Also, there are certain provisions of the State's protection strategy for Exceptional Tennessee Waters that establish more stringent requirements for these waters than established in 40 CFR § 131.12(a)(2) (e.g., 1200-4-3-.06 Subparagraph (4)(c) requires a review of the previous alternatives analysis for permits that are reissued for a discharge to Exceptional Tennessee Waters, even when there is no proposed expansion of the discharge).

There is no EPA requirement that a state include in its standards regulation a specific designation, such as Exceptional Tennessee Waters, to which the protections afforded under 40 CFR § 131.12(a)(2) apply. A state's antidegradation implementation methodology should address the appropriate waters, i.e., EPA's high quality waters, and ensure that these waters receive an appropriate level of review that is consistent with the provisions of 40 CFR § 131.12(a)(2).

Tennessee has chosen to include waters with available conditions and Exceptional Tennessee Waters as 40 CFR § 131.12(a)(2) waters in the State, and has included separate implementation procedures requiring a high quality waters decision process for each. Waters with available conditions include waters with water quality that is "better than the applicable criterion for a specific parameter," unless a water body or water body segment qualifies for protection under the Exceptional Tennessee Waters category. The State described this approach in the March 23, 2007 letter, as follows:

Additionally, we changed the names of some of the categories of protection to help reinforce that Tennessee uses a combination of antidegradation implementation approaches: the waterbody-by-waterbody identification of Exceptional Tennessee Waters and Outstanding National Resource Waters, plus the parameter-by-parameter regulation of Available and Unavailable Conditions. However, protection levels did not change.

Tennessee did not expand the available conditions category with the recent revisions. However, Tennessee did expand the list of criteria that relate to its previous High Quality Waters category. EPA considers the current available conditions category and the current Exceptional Tennessee Waters category, taken together, to be at least as inclusive as the two categories, as described in Tennessee's currently approved standards. Moreover, based on the statements made in the State's March 23, 2007 letter, as well as the State's Response to Public Comments received during the 2006 triennial review, EPA understands that, unless a water body is characterized as either an ONRW, or is determined to have unavailable conditions for a parameter, further alterations of the water body will be subject to the provisions for evaluation of "lowering of water quality," per the State's antidegradation policy statement in 1200-4-3-.06, for either waters with available conditions or Exceptional Tennessee Waters. Therefore, all Tennessee waters with water quality that is better than the levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water will be considered to be within one of these two high quality water categories and the antidegradation implementation process for that water body will apply.

For these reasons, EPA finds that the new provisions of 1200-4-3-.06 Subparagraph (4)(a) are consistent with 40 CFR § 131.12(a)(2).

1200-4-3-.06 Subparagraph (4)(b)

The department will maintain a list of water bodies that have been reviewed and are known to have one or more of the above characteristics on its website and will make paper copies of that list available upon request.

Analysis of 1200-4-3-.06 Subparagraph (4)(b)

Subparagraph (4)(b) was added to acknowledge the Department's practice of maintaining a list of Exceptional Tennessee Waters and making this list available to the public.

1200-4-3-.06 Subparagraphs (4)(c), (d), (e), (f), and (g)

Several minor revisions were made to the antidegradation statement for Exceptional Tennessee Waters (which replaced the previous designation of Tier II high quality waters). EPA's analysis of these revisions is summarized below.

All references to "Tier II high quality waters" were revised to the new category of Exceptional Tennessee Waters.

1200-4-3-.06 Subparagraph (4)(c)

The first sentence in Subparagraph (4)(c) was modified to reflect the revised name of the category for the waters addressed in this portion of the antidegradation policy statement. This sentence now addresses “degradation” in Exceptional Tennessee Waters, which links the definitions of degradation and *de minimis* in 1200-4-3-.04 with this category of waters. The State’s changes to the definitions of “degradation” in 1200-4-3-.04(3) and *de minimis* in 1200-4-3-.04(4) have the same effect for Exceptional Tennessee Waters as discussed above for waters with either unavailable or available conditions, i.e., in allowing thresholds of degradation which do not rise to the level of significant degradation for Exceptional Tennessee Waters.

The second sentence in Subparagraph (4)(c) was modified, as follows:

At the time of permit renewal, previously authorized discharges, including upstream discharges, which presently degrade **Exceptional Tennessee Waters**, will be subject to a **review of updated** alternatives analysis **information provided by the applicant**.

Analysis of 1200-4-3-.06 Subparagraph (4)(c)

EPA’s analysis of allowing a significance threshold, i.e., *de minimis* alteration, for Exceptional Tennessee Waters is identical to the analysis of this issue which starts on page 35. For the reasons discussed previously in this document, Tennessee’s use of a significance threshold in Exceptional Tennessee Waters is also consistent with CFR § 131.12.

The revisions to the second sentence of Subparagraph (4)(c) are considered by EPA as a clarification of the previous standard, and clearly state that a review will be required of updated information related to the previous information submitted by the applicant on the alternatives considered during the previous permit issuance/antidegradation decision process.

1200-4-3-.06 Subparagraph (4)(d)

The third sentence of (4)(d)3.was changed to reflect an updated reference to 1200-4-5-.06(4).

Analysis of 1200-4-3-.06 Subparagraph (4)(d)

The reference was updated in order to refer to the provision of the State’s NPDES permitting regulations for notification of the public in cases where the Department has made a tentative determination that the permit application will be denied based on a decision that proposed degradation is not justified.

1200-4-3-.06 (4)(e)1.

The second sentence in (4)(e)1. was modified, as follows:

Applicants requesting an economic/social necessity determination to allow degradation under this provision must provide all information required in order for the Department to make a determination that reasonable alternatives to degradation are not feasible. Reasonable alternatives for discharges may include, but are not limited to, connection to an existing collection system, land application, water reuse, water recycling, **or other treatment alternatives**.

Analysis of 1200-4-3-.06 (4)(e)1.

This provision is identical to the provision adopted in Paragraph (3) for new and expanded point source discharges to waters with available conditions, as it adds “other treatment alternatives” to the list of reasonable alternatives to be considered by applicants for new or expanded point source discharges to Exceptional Tennessee Waters. This adds flexibility for consideration of alternatives other than connection to an existing collection system, land application, water reuse, and water recycling on a case-by-case basis.

EPA asked the State to clarify the relationship of the alternatives required for an analysis of discharges to waters with available conditions and the alternatives required in review of discharges to Exceptional Tennessee Waters. In EPA’s December 3, 2007 letter, EPA asked, “Do the requirements in 1200-4-3-.06(3) for evaluation of alternatives in waters with ‘available conditions’ also apply for Exceptional Tennessee Waters, even though those requirements are not explicitly stated in the portion of the regulation that addresses Exceptional Tennessee Waters?” In the February 27, 2008 letter, Tennessee responded, “An analysis of alternatives is required for Exceptional Tennessee Waters. This is the clear implication of both 1200-4-3-.06(4)(c) and (d). It would not make sense to state the special case for existing discharges in (4)(c) if analysis of alternative were not required. This analysis may be satisfied by meeting the requirements of 1200-4-3-.06(3)(a).”

1200-4-3-.06 Paragraph (5)

Two sentences in Paragraph (5) were revised, as follows:

In surface waters designated by the Water Quality Control Board as ONRWs, no new discharges, expansions of existing discharges, or mixing zones will be permitted unless such activity will not result in **measurable** degradation of the water quality.

An assessment of environmental, economic, and social impacts will be prepared for each stream or stream segment proposed for ONRW designation. The assessment content and process will be determined by the **department** but will contain sufficient data and information to inform the Water Quality Control Board about environmental, economic, and social impact of ONRW designation.

Analysis of 1200-4-3-.06 Paragraph (5)

The State added the word “measurable” to the antidegradation statement for ONRWs in the provision, “In surface waters, designated by the Water Quality Control Board as ONRWs, no new discharges, expansions of existing discharges, or mixing zones will be permitted unless such

activity will not result in **measurable** degradation of the water quality. Existing water quality will be the criteria in these waters.” The State made this change in order to prohibit all but the most minimal new or expansions of discharges to ONRWs. In the State’s Response to Public Comments, Tennessee stated:

Comment C-15: *De minimis* impacts should not be authorized in ONRWs.

Response: The protection level for ONRWs requires that new discharges, expansions of existing discharges, or degradation be prohibited. We will add the word “unmeasurable” to 1200-4-3-.06(5) in order to reinforce the idea that only very small water quality changes can be authorized in ONRWs. This change will make it clear that the allowable impact to ONRWs is less than *de minimis*, but more than a molecule or two.

Although alterations which are *de minimis*, as now defined in 1200-4-3-.04(4), are consistent with 40 CFR 131.12(a)(2) in relation to high quality waters, the use of the term “*de minimis*” in Paragraph 5 would not be consistent with EPA’s regulatory requirement at 40 CFR § 131.12(a)(3) that “water quality shall be maintained and protected” in ONRWs. The State’s addition of the word “measurable” (i.e., “measurable degradation”) recognizes that it is possible that a new or expanded discharge could be permitted in an ONRW, but only if the discharge results in changes in water quality that are so small as to be immeasurable, (i.e., “more than a molecule or two” but not measurable).

The second revision reassigns the responsibility of determinations of the assessment content and process for the evaluation of the environmental, economic, and social impacts of ORNW designation to the Department of Environment and Conservation from the Division of Water Pollution Control. The provisions of 131.12(a) only include a general reference to “the State” in implementation of an antidegradation policy. Therefore, the federal regulation provides the states flexibility relating to the assignment of authority for these determinations.

For the reasons discussed above, EPA finds that the revision to 1200-4-3-.06 Paragraph (5) is consistent with 40 CFR § 131.12(a)(3).

Subparagraphs 1200-4-3-.06(5)(c) and (d)

In Subparagraph 1200-4-3-.06(5)(c), the portion of the West Prong of the Little Pigeon River that is designated as an ONRW was clarified, as follows:

Portion within Great Smoky Mountains National Park **upstream of Gatlinburg.**

In Subparagraph 1200-4-3-.06(5)(d), the portion of the Little Pigeon River that is designated as an ONRW was clarified, as follows:

Portion within Great Smoky Mountains National Park **downstream to the confluence of Mill Branch.**

Analysis of Subparagraphs 1200-4-3-.06(5)(c) and (d)

These two clarifications were made in order to more accurately describe the downstream boundaries of these two Outstanding National Resource Waters.

F. Changes within 1200-4-4 Use Classifications for Surface Waters

31. Revisions to Chapter 1200-4-4 included the addition of part .14 (Barren River Watershed) and its respective classifications, as well as trout/naturally reproducing trout classification modifications.

The Barren River Watershed was previously unspecified in Tennessee's water quality standards regulations. The revisions to 1200-4-4-.14 include the specific listing of the State's default uses (Fish & Aquatic Life (FAL), Recreation (REC), Livestock Watering & Wildlife (LWW), and Irrigation (IRR)) to specific waterbodies and the addition of Domestic Water Supply (DWS) or Trout Stream (TS) to four of the segments. The TS classification was added to Salt Lick Creek (mile 6.8 to 9.9). The DWS designated use was added to Middle Fork Drakes Creek (mile 22.2 to origin), Unnamed Tributary/Adams Spring to Puncheon Creek (entirety), and Spring Creek (entirety). A summary of the trout classifications, both TS and Naturally Reproducing Trout Stream (NRTS), revisions to the other basins are included as Attachment F.

The revisions contained in 1200-4-4 result in more protective criteria and/or designated uses and are determined to be consistent with section 101(a)(2) of the CWA and Part 131.

G. General Changes within 1200-4-3 General Water Quality Criteria

32. There were numerous editorial changes. Mostly, the revisions included revised numbering/lettering, order changes to increase readability, and additions to administrative history sections.

These minor editorial revisions are consistent with the CWA and Part 131.

Section 7(a)(2) Endangered Species Act (ESA) Review

As part of the review, informal consultation with the Cookeville, Tennessee Field Office of the U.S. Fish and Wildlife Service (FWS) was initiated by email on November 27, 2006, through a request for the most current listing of species and critical habitat found in the state of Tennessee. Section 7(a)(2) requires federal agencies, in consultation with the Services, to ensure that their actions are not likely to jeopardize the continued existence of federally listed species or result in the destruction or adverse modification of designated critical habitat of such species.

In January 2001, EPA, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service signed a memorandum of agreement (MOA) including the following stipulations in relation to State adoption, and EPA review of, water quality criteria:

EPA and the Services will also conduct a section 7 consultation on the aquatic life criteria (water quality criteria published by EPA under section 304(a) authorities) to assess the effect of the criteria on listed species and designated critical habitat.

EPA and the Services recognize, however, that conducting consultations on a State-by-State basis is not the most efficient approach to evaluating the effects of water pollution on endangered and threatened species throughout the country. National 304(a) consultations will ensure a consistent approach to evaluating the effects of pollutants on species and identifying measures that may be needed to better protect them. National consultations will also ensure better consideration of effects on species whose ranges cross State boundaries.

The national consultation will provide section 7 coverage for any water quality criteria included in State or Tribal water quality standards approved, or Federal water quality standards promulgated, by EPA that are identical to or more stringent than the recommended section 304(a) criteria. Therefore, separate consultation on such criteria will not be necessary, subject to the requirements related to reinitiation of consultation under 50 CFR § 402.16. . . . EPA and the Services agree that EPA may proceed with its action pending the conclusion of the national consultation.

A biological evaluation (BE) of the effect of the revisions on Federally listed species and critical habitats found in Tennessee was developed and sent to FWS. The conclusion of the BE was that the standards revisions related to 1200-4-3-.03(3)(d), 1200-4-3-.03(3)(i), 1200-4-3-.03(3)(o), 1200-4-3-.05(2), 1200-4-3-.05(4), and 1200-4-4 are not likely to adversely affect listed species or their critical habitat. EPA concluded that any effect that may result will be beneficial or insignificant. EPA's decision to approve Tennessee's standards is subject to completion of ESA consultation with the FWS.

By approving the standards "subject to the results of consultation under section 7(a)(2) of the ESA," EPA has explicitly stated that it retains its discretion to take appropriate action if the consultation identifies deficiencies in the standards requiring remedial action by EPA. Furthermore, EPA's approval of the new/revised standards will not cause any impacts of concern to the species/critical habitat during the interim period until consultation is concluded. EPA will notify Tennessee of the results of the section 7 consultation, upon completion of the action.

Summary of Conclusions

With the exception of the revision to 1200-4-3-.03(4)(l), the revisions to State water quality standards identified in this document are determined to be consistent with the applicable provisions of the CWA and the requirements of 40 CFR Part 131. The revision to 1200-4-3-.03(4)(l) was determined not to be a water quality standard subject to EPA review under section 303(c).

ATTACHMENT A – Revisions to 1200-4-3-.03(3)(g)
(revisions are shown in bold underline or bold strikeout)

Compound	Criterion Maximum Concentration ug/l (CMC)	Criterion Continuous Concentration ug/l (CCC)
Arsenic (III)*	340	150
Cadmium **	2.0	0.25
Chromium, total	---	100
Chromium, III**	570	74
Chromium, VI*	16	11
Copper **	13	9.0
Lead **	65	2.5
Mercury*	1.4	0.77
Nickel **	470	52
Selenium	20	5
Silver **	3.2	---
Zinc **	120	120
Cyanide***	22	5.2
Chlorine (TRC)	19	11
Pentachlorophenol ****	19	15
Aldrin	3.0	---
g-BHC - Lindane	2.0 0.95	0.08 ---
Chlordane	2.4	0.0043
4-4'-DDT	1.1	0.001
Dieldrin	0.24	0.056
a-Endosulfan	0.22	0.056
b-Endosulfan	0.22	0.056
Endrin	0.086	0.036
Heptachlor	0.52	0.0038
Heptachlor epoxide	0.52	0.0038
PCBs, total each areol	---	0.014
Toxaphene	0.73	0.0002
Tributyltin (TBT)	0.46	0.072

* Criteria for these metals are expressed as dissolved.

** Criteria for these metals are expressed as dissolved and are a function of total hardness....

*** If Standard Methods ... used, this criterion may be applied as free cyanide.

**** Criteria for pentachlorophenol are expressed as a ...

Hardness Dependent Variables (only new values shown)

Chemical	M _A	b _A	M _C	B _C	Freshwater Conversion Factors (CF)	
					CMC	CCC
Chromium III	0.8190	3.7256	0.8190	0.6848	0.316	0.860

**ATTACHMENT B – July 2, 2007 Email from Gregory Denton to Lauren Petter
Concerning Pickwick Lake Supporting Materials**



"Gregory Denton "
<Gregory.Denton@state.tn.us
>

07/02/2007 09:16 AM

To Lauren Petter/R4/USEPA/US@EPA
cc
bcc
Subject Re: Fw: Pickwick Lake

Lauren-

We do not have any additional supporting materials.

GMD

>>> <Petter.Lauren@epamail.epa.gov> 7/2/2007 8:11 AM >>>

Greg,
I just wanted to follow up on an email I sent you last year since I couldn't find a specific response to it. I only wanted to add that it would also be okay to submit the type of additional information I requested below as part of Tennessee's actual submission to EPA (if applicable). However, if you do not have any additional information just let me know that too so that I can address this revision accordingly in the decision document that we draft. A response for your preference on how you'd like to handle this would be appreciated.
Thanks,
Lauren

----- Forwarded by Lauren Petter/R4/USEPA/US on 06/29/2007 09:51 AM

Lauren
Petter/R4/USEPA/
US

11/06/2006 11:53
AM

To
Gregory.Denton@state.tn.us
cc
Subject
Pickwick Lake

Greg,
Per our phone conversation, you indicated TDEC's concurrence with ADEM's rationale for the chlorophyll a criterion for Pickwick Lake and adopted by Tennessee. I am attaching ADEM's supporting rationale for the adoption of chlorophyll a criteria in several of their lakes. Pickwick Lake is included within this document. Can you confirm by letting me know whether or not you would like to provide any additional information as it relates to Tennessee's portion of the lake for the criterion rationale, the use support determinations, or anything else you feel is

relevant?
Thanks,
Lauren

(See attached file: NutrientCriteriaSupport_PickwickLake.pdf)

Lauren Petter, Environmental Scientist
Water Management Division
West Standards, Monitoring, and TMDL Section
404/562-9272
Petter.Lauren@epa.gov



Lauren Petter /R4/USEPA/US

07/02/2007 09:11 AM

To Gregory.Denton@state.tn.us

cc

bcc

Subject Fw: Pickwick Lake

Greg,

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Thanks,

Lauren

----- Forwarded by Lauren Petter/R4/USEPA/US on 06/29/2007 09:51 AM -----



Lauren Petter /R4/USEPA/US

11/06/2006 11:53 AM

To Gregory.Denton@state.tn.us

cc

Subject Pickwick Lake

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Thanks,

Lauren



NutrientCriteriaSupport_PickwickLake.pdf

Lauren Petter, Environmental Scientist
Water Management Division
West Standards, Monitoring, and TMDL Section
404/562-9272
Petter.Lauren@epa.gov

Nutrient Criteria for Alabama Reservoirs (2002)

Summary of Data and Methodology Used in Establishing Criteria

In a continuing effort to protect Alabama reservoirs from nutrient over-enrichment, the Alabama Department of Environmental Management (ADEM) developed chlorophyll *a* criteria for Weiss Lake, West Point Lake, R.L. Harris Lake, and Walter F. George Lake in 2001 and nine reservoirs in 2002: Guntersville, Wheeler, Wilson, Pickwick, Little Bear Creek, and Cedar Creek in the Tennessee River Basin and Yates, Thurlow, and Lake Martin in the Tallapoosa River Basin. In addition, the chlorophyll *a* criterion for the Walter F. George reservoir was revised to coincide with Georgia's criteria. The nutrient criteria for these latter nine reservoirs were adopted by the Environmental Management Commission on June 25, 2002. The purpose of this document is to summarize the data, supporting rationale and methodology used in establishing these criteria.

The Department has elected to use chlorophyll *a* as the primary indicator of cultural eutrophication. (The term "cultural eutrophication" is used to differentiate between over-enrichment caused by human activities and natural nutrient loading from soils and parent materials indigenous to each watershed.) The chlorophyll *a* criteria are established on a growing season basis, defined as April through October for all Alabama reservoirs, with the exception of four mainstem reservoirs on the Tennessee River where the growing season is defined as April through September.

The data used to derive the chlorophyll *a* criteria are summarized in Appendices A through I. These data are incorporated into graphs showing general trends in chlorophyll *a* and total phosphorus concentrations for each reservoir over time. Because the same rationale and methodology were used in establishing nutrient criteria for each reservoir (with the exception of the Walter F. George reservoir), these topics will be detailed in the following sections without reference to any specific water body.

Supporting Rationale and Methodology

In developing nutrient criteria, the Department sought to determine nutrient levels that are protective of the existing and designated uses of each reservoir. Keeping in mind that these reservoirs are enjoyed by anglers and swimmers alike, nutrient criteria were targeted that would protect the multiple and varied uses. Thus, the Department's rationale was to establish nutrient criteria consistent with the "fishable/swimmable" goal of the Clean Water Act that protect the beneficial uses designated for each reservoir.

Located within 14 major river basins and 25 different sub-ecoregions, Alabama's reservoirs represent some of the most biologically diverse aquatic ecosystems in the United States. Because of the large diversity in geographic and climate conditions from one region to another, as well as the significant variability in dam operations between reservoirs, the Department developed nutrient criteria on a lake-specific basis rather than on a more aggregate basis such as an ecoregional approach. The lake-specific approach captures the large variability inherent in man-made reservoirs, where chlorophyll *a* concentrations are typically a strong function of such factors as reservoir depth, reservoir retention time, and scheduling of power generation.

During the criteria development process, historical data were studied to provide an overall perspective of the condition of each reservoir. This information was analyzed to determine trends in trophic conditions, the degree to which reservoir conditions remained stable over time, and whether any impairments have occurred due to nutrient over-enrichment. From this data, nutrient levels (expressed as seasonal means of chlorophyll a concentrations) were targeted that correlate with reservoir conditions that support the designated beneficial uses. The historical data expresses the diversity of reservoir conditions in Alabama, from lakes in the Tallapoosa River Basin that are naturally oligotrophic, such as lakes Martin, Yates and Thurlow, to lakes that tend to be more eutrophic in nature, such as the mainstem reservoirs on the Tennessee River.

The Department recognizes that using reference condition analysis to establish nutrient criteria in reservoirs can be limited due to the fact that there is uncertainty regarding what constitutes “natural” conditions in a man-made water body. Therefore, in developing nutrient criteria, the Department has selected to analyze historical ambient data on an individual reservoir basis to determine if each reservoir continues to support its designated uses. If so, the nutrient concentrations that have, over time, corresponded to the reservoir’s use support are evaluated to determine a chlorophyll a target for that specific reservoir. This same approach is used regardless of the reservoir’s trophic state (i.e. eutrophic, oligotrophic, or mesotrophic). Thus, the intent is that the selected chlorophyll a criteria values are specifically associated with a condition of full use support in each respective reservoir, taking into account the factors unique to various trophic conditions. The remainder of this document focuses on eutrophic reservoirs because most of the nine reservoirs (i.e. Tennessee Basin Reservoirs) that were assigned chlorophyll a criteria in 2002 are considered to be eutrophic in nature.

The data analysis revealed that in the historically eutrophic reservoirs, there have been no significant occurrences of water quality problems associated with nutrient over-enrichment. For example, there have been no significant instances of algal blooms, expanded macrophyte growth, fish kills, increased sediment accumulation rates, or species shifts of flora and fauna. Also, with the exception of Wheeler Lake (previously listed as impaired due to temperature and pH), there have been no significant water quality impairments on these eutrophic reservoirs and none have been included on the 303(d) list. These water bodies have continued to support their beneficial uses by sustaining fisheries as well as sufficient water quality for swimming and other recreational activities.

Nutrient criteria were developed to protect the existing uses that define each of these reservoir systems. Data for the Tennessee River reservoirs (spanning nine growing seasons) were analyzed to determine the ranges of chlorophyll a and total phosphorus concentrations historically occurring in each reservoir. To maintain nutrient levels within the ranges associated with use-supportive conditions, chlorophyll a criteria were selected from the upper percentiles of the data sets to derive values that “cap” each reservoir system with a maximum allowable chlorophyll a concentration.

To determine what constitutes healthy conditions in eutrophic-type reservoirs and how trophic gradients relate to use attainment, the Department utilized much of the research conducted by Dr. David Bayne at Auburn University. This research examines how the quality of fisheries correlates to varying trophic conditions in Alabama reservoirs. The study assesses the potential impacts of reverse eutrophication and nutrient reduction on reservoir fisheries and calculates target levels of primary production that provide both quality fishing and satisfactory water clarity for other recreational users. This research (“Compatibility between Water Clarity and Quality Black Bass and Crappie Fisheries in Alabama”; American Fisheries Society Symposium 16:296-305. 1996) provides substantial evidence that fish biomass and sport-fish harvesting are positively correlated to algal production in reservoirs.

The research by Dr. Bayne demonstrates that the size, growth rates and condition of certain species of sports fish are generally higher in eutrophic than in oligo-mesotrophic reservoirs. This study, along with case studies of reservoirs in other regions, raises the concern that the reversal of eutrophication and improvement in water clarity in some reservoirs can be deleterious to its warm-water sports fisheries by reducing fish production and biomass. The Department, therefore, believes that when establishing nutrient criteria, it is vital to set water quality standards that adequately protect all the beneficial uses of the reservoir, fishing and swimming alike. Thus, caution is warranted when regulatory actions can potentially result in an undesirable shift in fish species. If, historically, a reservoir has supported all of its uses and has sustained high-quality fisheries, nutrient criteria were targeted to preserve these reservoir conditions.

Chlorophyll a

Chlorophyll a criteria serve as the primary tool used by the Department to protect the designated uses of lakes and reservoirs from nutrient over-enrichment. These criteria are used to assess reservoir conditions (i.e. trophic state) and to determine use-support status (i.e. 303(d) listing and 305(b) reporting). The chlorophyll a criteria are also used as water quality targets necessary for Total Maximum Daily Load (TMDL) development. For example, when a reservoir is determined to be nutrient impaired, the necessary pollutant load reductions (i.e. total phosphorus loads) necessary to achieve the lake-specific chlorophyll a criteria are determined through various modeling tools such as EFDC and WASP. Chlorophyll a was selected as the candidate response variable because it is widely accepted among limnologists, scientists, and federal/state agencies as an effective surrogate for estimating the primary production response to nutrient loading. Chlorophyll a is also relatively easy and inexpensive to collect and analyze.

The chlorophyll a criteria are established on a growing-season basis, which is defined as April through October for all reservoirs with the exception of four mainstem reservoirs in the Tennessee River basin. These reservoirs have a defined growing season of April through September. The chlorophyll a criteria are represented as the mean of samples (taken as photic-zone composites) collected monthly during the defined growing season. The criteria are established at specific locations within the reservoir, such as dam forebay or mid-reservoir, and should not be applied as lake-wide averages or as levels that shall be maintained at all locations within the lake at any given time.

The established chlorophyll a criteria are selected to protect the designated uses in the majority of the reservoir, recognizing that the criteria may not be protective of the tributary embayments of the reservoir. Because of the non-uniform, complex nature of embayments and the fact they are directly interrelated with tributaries, it is difficult to derive a single criteria value that is protective of an entire reservoir including its embayments. A “one size fits all” approach truly oversimplifies the complex nature of these reservoir systems and is not the preferred method of protecting designated uses. To address this complexity, the Department intends to continue embayment sampling as a part of the Reservoir Monitoring Program. Information obtained will be evaluated to determine the degree to which nutrients may be affecting designated use support and, where appropriate (i.e. where designated uses are threatened or impaired), criteria may be established to protect those designated uses.

At the present time, the Department does not believe it is necessary to develop numeric criteria for other nutrient indicators such as total phosphorus (TP), total nitrogen (TN), or Secchi depth. However, these and many other parameters have and will continue to be routinely sampled as part of the Department's reservoir monitoring program. The significance of these variables and their relation to nutrient loading will continually be evaluated as new data is collected. While chlorophyll a provides a reliable depiction of primary production levels and thus gives a fairly accurate assessment of nutrient conditions in a water body, it is uncertain how effective the other parameters are in assessing nutrient over-enrichment. For example, because there is such variability in how each water body responds to nutrient loading, it is difficult to determine what concentrations of TP and TN correlate to undesired levels of primary production. Also, establishing meaningful relationships between causal and response variables is often problematic. Low concentrations of TP, for example, can correlate to both low and high phytoplankton biomass levels; the latter occurring when originally high TP concentrations are significantly reduced as excessive nutrients are assimilated within the growing phytoplankton biomass.

Establishing meaningful relationships between chlorophyll a and Secchi depth is also problematic. Poor water clarity can result from a number of causes other than nutrient over-enrichment. A low Secchi-depth measurement might be caused by abiogenic turbidity consisting of suspended non-algal particulate matter such as clay. The Department will continue to examine linkages between chlorophyll a and other nutrient parameters as more data is collected. Also, because the relationships between nutrient impairment and chlorophyll a levels are not always well understood, it may be necessary to revise the criteria as additional water quality data and improved assessment tools become available.

Use Support Determination

The chlorophyll a criteria provide an effective decision-making tool for resource management and planning. Based on seasonal means of chlorophyll a concentrations, the Department will determine if reservoir conditions are supportive of designated uses or if the reservoir is impaired due to nutrient over-enrichment and should be added to Alabama's 303(d) list for impaired waters. The same criteria will be used to determine when remediation of an impaired water body has achieved water quality standards to allow it to be removed from the 303(d) list. The Department is currently revising the assessment and listing methodology it will use when utilizing chlorophyll a data in use support determinations.

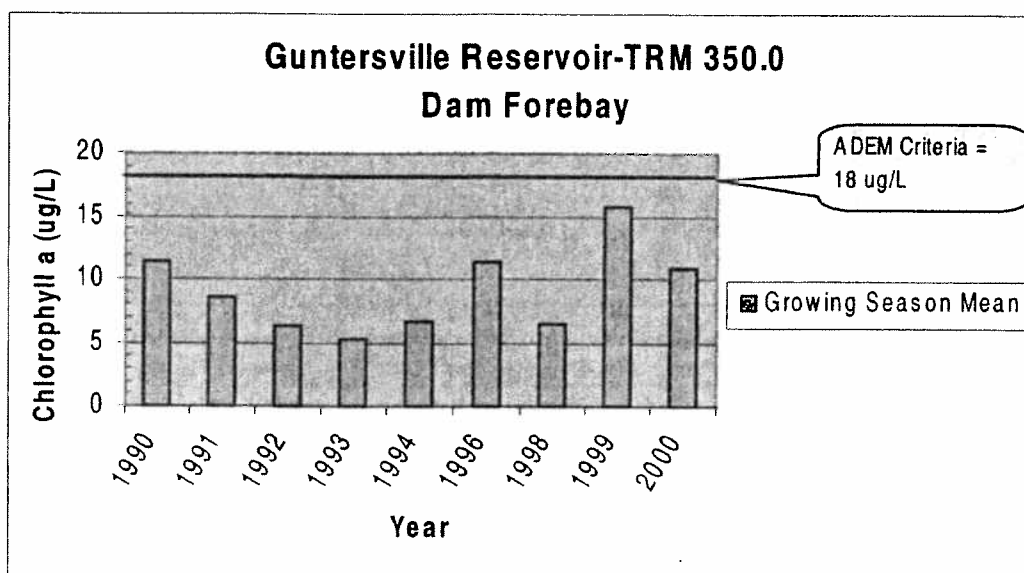
When a reservoir is determined to be nutrient-impaired in accordance with the finalized assessment and listing methodology, the Department will gather the data and information necessary to evaluate the potential causes and sources of the impairment. Assessment tools, including hydrologic and water quality modeling, will be utilized to assess the cause and effect relationships leading to the water quality standards violation. (For those reservoirs in the Coosa River Basin currently impaired due to nutrient over-enrichment, WASP and EFDC models are presently being utilized to evaluate the cause and effect relationships between nutrient loading and algal biomass.) Once water quality modeling has determined the nutrient loads necessary to bring the water body back into compliance, a TMDL will be developed accordingly (ADEM, October 2003: Draft Nutrient TMDLs for the Coosa River Basin Reservoirs).

Appendix A—Data Analysis for Guntersville Lake

Chlorophyll a Data

Year	Growing Season Mean (µg/L)	April	May	June	July	Aug.	Sept.	Growing Season TSI	TSI Classification	Annual Average Retention Time (days)
1990	11.3	7	5	22	14	14	6	54.4	eutrophic	
1991	8.7	10	9	4	20	3	6	51.8	eutrophic	
1992	6.3	7	7	11	4	7	2	48.7	eutrophic	
1993	5.3	6	4	5	9	4	4	47.0	eutrophic	
1994	6.7	1	15	7	5	5	7	49.2	eutrophic	8.3
1996	11.3	5	12	16	15	9	11	54.4	eutrophic	9.9
1998	6.5	3	6	6	5	8	11	49.0	eutrophic	10.9
1999	15.8	10	15	28	14	12	no data	57.7	eutrophic	15.6
2000	10.8	14	10	12	6	14	9	54.0	eutrophic	19.8

<i>Mean</i>	9.2	7.0	9.2	12.3	10.2	8.4	7.0	52.4
<i>Median</i>	8.7	7.0	9.0	11.0	9.0	8.0	6.5	51.8
<i>GeoMean</i>	8.7	5.7	8.4	10.1	8.8	7.5	6.2	51.8
<i>StdDev</i>	3.4	3.9	4.1	8.3	5.7	4.2	3.2	n/a
<i>25th%</i>	6.5	5.0	6.0	6.0	5.0	5.0	5.5	49.0
<i>50th%</i>	8.7	7.0	9.0	11.0	9.0	8.0	6.5	51.8
<i>75th%</i>	11.3	10.0	12.0	16.0	14.0	12.0	9.5	54.4
<i>90th%</i>	12.2	10.8	15.0	23.2	16.0	14.0	11.0	55.2
<i>95th%</i>	14.0	12.4	15.0	25.6	18.0	14.0	11.0	56.5

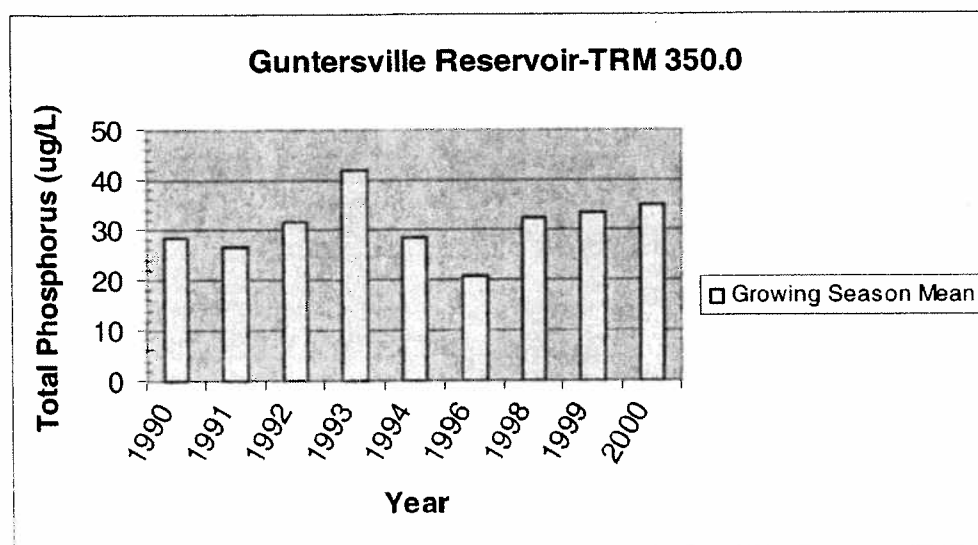


Appendix A—Data Analysis for Guntersville Lake

Total Phosphorus Data

Year	Growing Season Mean (µg/L)	April	May	June	July	Aug.	Sept.	Growing Season TSI	TSI Classification	Annual Average Retention Time (days)
1990	28.3	50.0	20.0	40.0	20.0	20.0	20.0	52.4	eutrophic	
1991	26.7	20.0	30.0	20.0	30.0	30.0	30.0	51.5	eutrophic	
1992	31.7	30.0	30.0	30.0	30.0	30.0	40.0	54.0	eutrophic	
1993	42.0	no data	30.0	20.0	20.0	100.0	40.0	58.0	eutrophic	
1994	28.3	50.0	30.0	20.0	30.0	20.0	20.0	52.4	eutrophic	
1996	20.7	2.0	no data	30.0	no data	30.0	no data	47.8	mesotrophic	
1998	32.5	50.0	no data	30.0	no data	20.0	30.0	54.3	eutrophic	
1999	33.3	40.0	30.0	40.0	40.0	20.0	30.0	54.7	eutrophic	
2000	35.0	50.0	14.0	35.0	31.0	40.0	40.0	55.4	eutrophic	

<i>Mean</i>	30.9	36.5	26.3	29.4	28.7	34.4	31.3	53.6
<i>Median</i>	31.7	45.0	30.0	30.0	30.0	30.0	30.0	54.0
<i>GeoMean</i>	30.4	27.2	25.4	28.4	28.0	29.6	30.2	53.4
<i>StdDev</i>	6.0	17.9	6.6	8.1	6.9	25.5	8.3	29.9
<i>25th%</i>	28.3	27.5	25.0	20.0	25.0	20.0	27.5	52.4
<i>50th%</i>	31.7	45.0	30.0	30.0	30.0	30.0	30.0	54.0
<i>75th%</i>	33.3	50.0	30.0	35.0	30.5	30.0	40.0	54.7
<i>90th%</i>	36.4	50.0	30.0	40.0	34.6	52.0	40.0	56.0
<i>95th%</i>	39.2	50.0	30.0	40.0	37.3	76.0	40.0	57.1

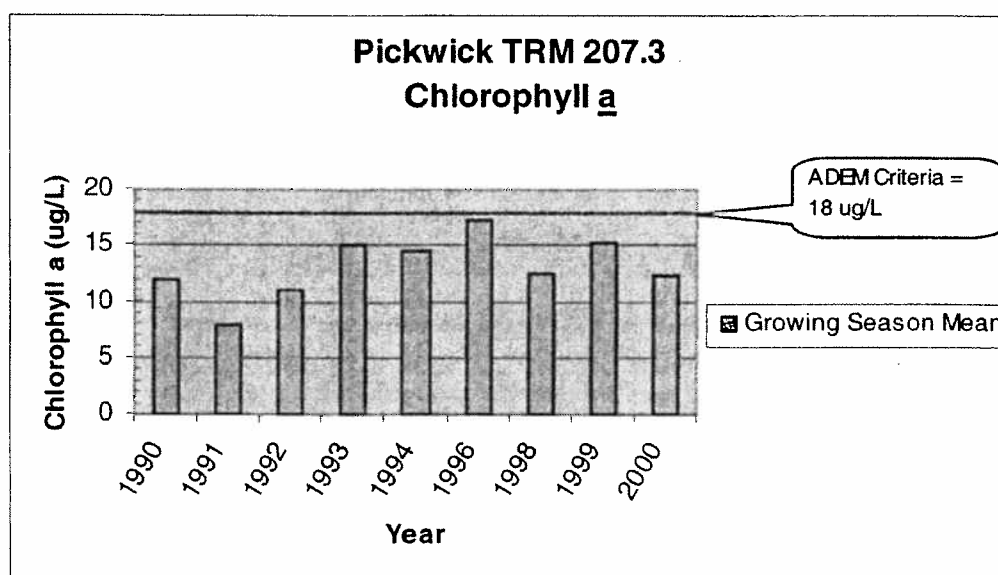


Appendix B—Data Analysis for Pickwick Lake

Chlorophyll a Data

Year	Growing Season Mean (µg/L)	April	May	June	July	Aug.	Sept.	Growing Season TSI	TSI Classification	Annual Average Retention Time (days)
1990	12.0	13	5	17	12	9	16	55.0	eutrophic	
1991	7.8	6	3	7	10	7	14	50.8	eutrophic	
1992	11.0	7	11	13	12	9	14	54.1	eutrophic	
1993	15.0	24	10	12	16	3	25	57.2	eutrophic	
1994	14.5	3	3	31	15	21	14	56.8	eutrophic	5.9
1996	17.2	26	15	16	18	7	21	58.5	eutrophic	7.2
1998	12.5	5	13	28	3	15	11	55.4	eutrophic	7.8
1999	15.2	30	3	24	14	9	11	57.3	eutrophic	10.9
2000	12.3	3	20	19	15	13	4	55.2	eutrophic	14.6

<i>Mean</i>	13.1	13.0	9.2	18.6	12.8	10.3	14.4	41.2
<i>Median</i>	12.5	7.0	10.0	17.0	14.0	9.0	14.0	40.6
<i>GeoMean</i>	12.8	9.2	7.3	17.0	11.6	9.1	13.1	40.9
<i>StdDev</i>	2.8	10.8	6.1	7.8	4.4	5.3	6.0	18.8
<i>25th%</i>	12.0	5.0	3.0	13.0	12.0	7.0	11.0	40.0
<i>50th%</i>	12.5	7.0	10.0	17.0	14.0	9.0	14.0	40.6
<i>75th%</i>	15.0	24.0	13.0	24.0	15.0	13.0	16.0	43.2
<i>90th%</i>	15.6	26.8	16.0	28.6	16.4	16.2	21.8	43.7
<i>95th%</i>	16.4	28.4	18.0	29.8	17.2	18.6	23.4	44.5

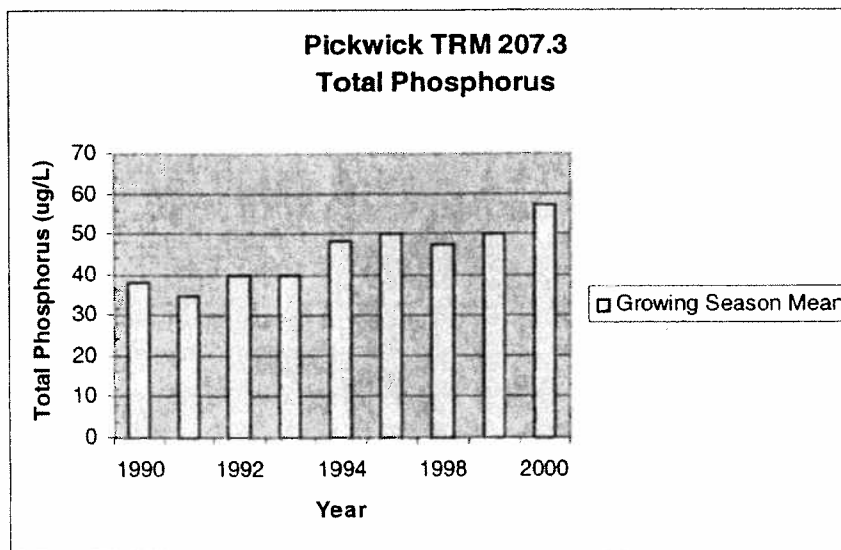


Appendix B—Data Analysis for Pickwick Lake

Total Phosphorus Data

Year	Growing Season Mean (µg/L)	April	May	June	July	Aug.	Sept.	Growing Season TSI	TSI Classification	Annual Average Retention Time (days)
1990	38.3	20.0	30.0	40.0	60.0	30.0	50.0	56.7	eutrophic	
1991	35.0	40.0	60.0	30.0	20.0	40.0	20.0	55.4	eutrophic	
1992	40.0	30.0	50.0	30.0	30.0	40.0	60.0	57.3	eutrophic	
1993	40.0	no data	50.0	30.0	40.0	40.0	40.0	57.3	eutrophic	
1994	48.3	70.0	50.0	50.0	40.0	40.0	40.0	60.1	eutrophic	5.9
1996	50.0	50.0	no data	40.0	no data	60.0	no data	60.6	eutrophic	7.2
1998	47.5	40.0	no data	60.0	no data	40.0	50.0	59.8	eutrophic	7.8
1999	50.0	no data	70.0	30.0	50.0	40.0	60.0	60.6	eutrophic	10.9
2000	57.3	60.0	68.0	57.0	39.0	50.0	70.0	62.5	eutrophic	14.6

<i>Mean</i>	45.2	44.3	54.0	40.8	39.9	42.2	48.8	59.1
<i>Median</i>	47.5	40.0	50.0	40.0	40.0	40.0	50.0	59.8
<i>GeoMean</i>	44.7	41.2	52.3	39.3	37.9	41.5	46.0	58.9
<i>StdDev</i>	7.2	17.2	13.6	12.2	12.9	8.3	15.5	32.6
<i>25th%</i>	40.0	35.0	50.0	30.0	34.5	40.0	40.0	57.3
<i>50th%</i>	47.5	40.0	50.0	40.0	40.0	40.0	50.0	59.8
<i>75th%</i>	50.0	55.0	64.0	50.0	45.0	40.0	60.0	60.6
<i>90th%</i>	51.5	64.0	68.8	57.6	54.0	52.0	63.0	61.0
<i>95th%</i>	54.4	67.0	69.4	58.8	57.0	56.0	66.5	61.8

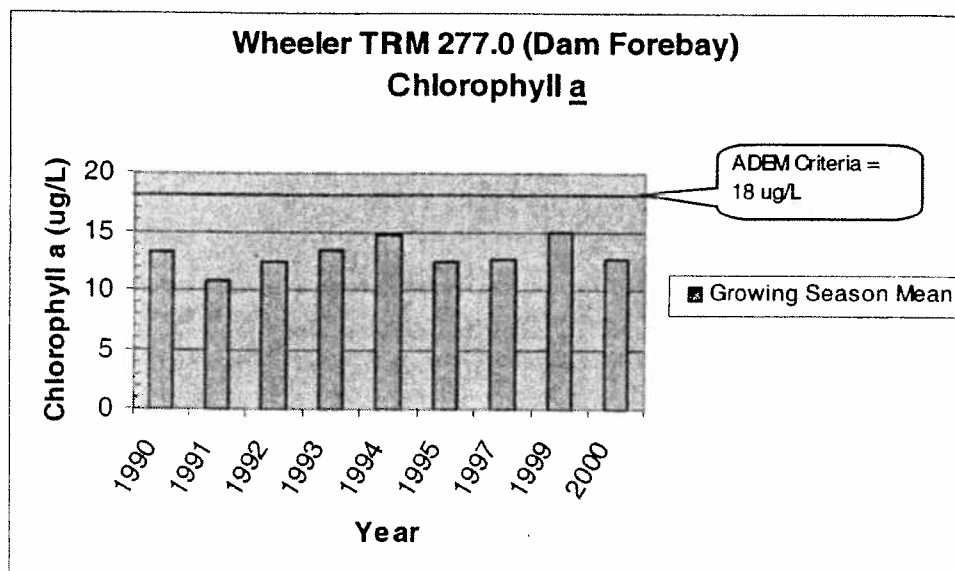


Appendix C—Data Analysis for Wheeler Lake

Chlorophyll a Data

Year	Growing Season Mean (µg/L)	April	May	June	July	Aug.	Sept.	Growing Season TSI	TSI Classification	Annual Average Retention Time (days)
1990	13.3	10	7	19	20	17	7	56.0	eutrophic	
1991	10.8	6	15	17	7	7	13	54.0	eutrophic	
1992	12.5	6	18	33	9	5	4	55.4	eutrophic	
1993	13.5	24	8	10	9	24	6	56.1	eutrophic	
1994	14.8	5	21	17	8	14	24	57.1	eutrophic	7.3
1995	12.4	10	30	4	10	8	no data	55.3	eutrophic	10.8
1997	12.7	23	4	5	6	22	16	55.5	eutrophic	8.8
1999	15.0	25	12	23	14	10	6	57.2	eutrophic	13.2
2000	12.7	2	26	12	12	13	11	55.5	eutrophic	17.1

<i>Mean</i>	13.1	13.6	14.4	16.0	10.4	13.4	10.9	55.9
<i>Median</i>	13.0	10.0	13.5	17.0	9.0	12.0	7.0	55.8
<i>GeoMean</i>	13.1	11.2	12.1	13.0	9.7	11.7	9.1	55.8
<i>StdDev</i>	1.4	8.8	8.5	9.6	4.6	7.1	7.2	n/a
<i>25th%</i>	12.5	6.0	7.8	8.8	7.8	7.8	6.0	55.4
<i>50th%</i>	13.0	10.0	13.5	17.0	9.0	12.0	7.0	55.8
<i>75th%</i>	13.8	23.3	18.8	20.0	11.0	18.3	14.5	56.4
<i>90th%</i>	14.9	24.3	23.7	26.0	15.8	22.6	19.2	56.5
<i>95th%</i>	14.9	24.7	26.9	29.5	17.9	23.3	21.6	57.1

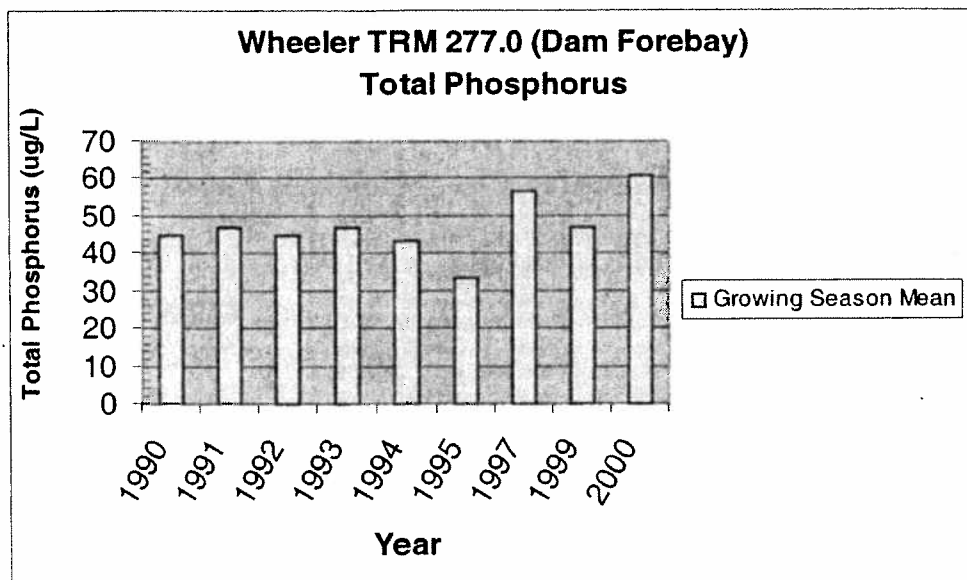


Appendix C—Data Analysis for Wheeler Lake

Total Phosphorus Data

Year	Growing Season Mean (µg/L)	April	May	June	July	Aug.	Sept.	Growing Season TSI	TSI Classification	Annual Average Retention Time (days)
1990	45.0	40.0	40.0	60.0	40.0	30.0	60.0	59.0	eutrophic	
1991	46.7	80.0	60.0	30.0	30.0	40.0	40.0	59.6	eutrophic	
1992	45.0	40.0	40.0	50.0	40.0	40.0	60.0	59.0	eutrophic	
1993	46.7	60.0	70.0	40.0	30.0	30.0	50.0	59.6	eutrophic	
1994	43.3	70.0	40.0	40.0	50.0	30.0	30.0	58.5	eutrophic	7.3
1995	33.3	50.0	no data	40.0	no data	10.0	no data	54.7	eutrophic	10.8
1997	56.7	30.0	no data	70.0	no data	70.0	no data	62.4	eutrophic	8.8
1999	46.7	30.0	80.0	40.0	50.0	40.0	40.0	59.6	eutrophic	13.2
2000	60.8	70.0	55.0	58.0	52.0	50.0	80.0	63.4	eutrophic	17.1

<i>Mean</i>	47.1	52.2	55.0	47.6	41.7	37.8	51.4	59.7
<i>Median</i>	46.7	50.0	55.0	40.0	40.0	40.0	50.0	59.6
<i>GeoMean</i>	46.5	49.2	53.1	46.1	40.8	34.0	49.1	59.5
<i>StdDev</i>	7.9	18.6	16.1	12.8	9.3	16.4	16.8	33.9
<i>25th%</i>	45.0	40.0	40.0	40.0	35.0	30.0	40.0	59.0
<i>50th%</i>	46.7	50.0	55.0	40.0	40.0	40.0	50.0	59.6
<i>75th%</i>	46.7	70.0	65.0	58.0	50.0	40.0	60.0	59.6
<i>90th%</i>	57.5	72.0	74.0	62.0	50.8	54.0	68.0	62.6
<i>95th%</i>	59.2	76.0	77.0	66.0	51.4	62.0	74.0	63.0



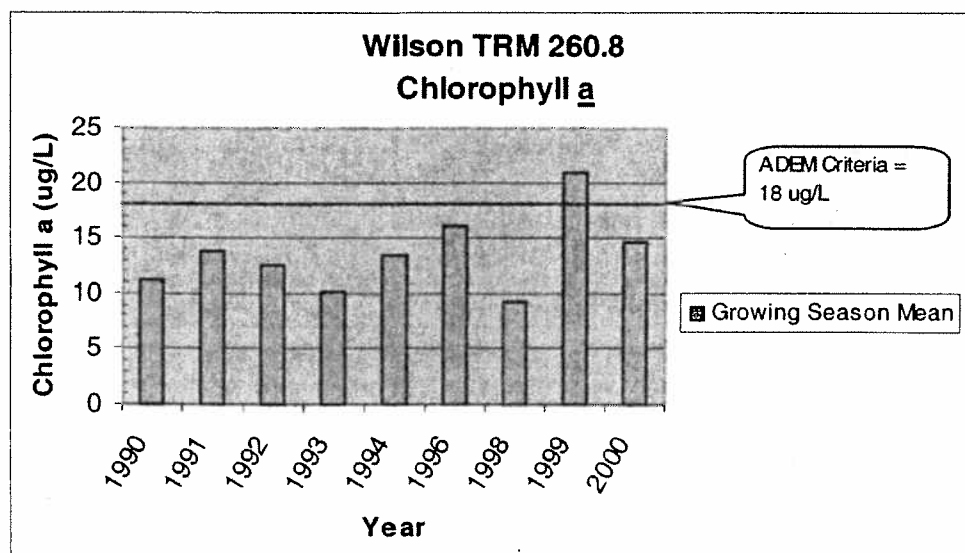
Appendix D—Data Analysis for Wilson Lake

Chlorophyll a Data

Year	Growing Season Mean (µg/L)	April	May	June	July	Aug.	Sept.	Growing Season TSI	TSI Classification	Annual Average Retention Time (days)
1990	11.2	13	3	20	13	16	2	54.3	eutrophic	
1991	13.8	10	6	25	8	6	28	56.4	eutrophic	
1992	12.6	5	20	12	19	4	15	55.4	eutrophic	
1993	10.2	3	25	11	9	9	4	53.4	eutrophic	
1994	13.5	2	25	30	2	9	13	56.1	eutrophic	4.2
1996	16.2	5	34	7	4	32	15	57.9	eutrophic	5.1
1998	9.3	2	17	17	2	7	11	52.5	eutrophic	5.6
1999	21.0	31	33	17	20	12	13	60.5	hypereutrophic	7.9
2000	14.7	7	14	22	33	7	5	56.9	eutrophic	10.4

Mean	13.5	8.9	20.4	17.4	9.6	11.9	12.6	56.1
Median	13.0	5.0	22.7	17.0	8.5	9.0	13.0	55.8
GeoMean	13.1	5.8	16.0	15.9	7.0	9.8	9.9	55.8
StdDev	3.7	9.8	11.4	7.6	7.2	8.9	7.9	n/a
25th%	10.9	2.8	14.3	11.8	3.5	6.8	9.3	54.0
50th%	13.0	5.0	22.7	17.0	8.5	9.0	13.0	55.8
75th%	14.4	10.8	27.0	21.3	14.5	13.0	15.0	56.8
90th%	17.6	18.4	33.3	26.5	19.3	20.8	18.9	57.0
95th%	19.3	24.7	33.7	28.3	19.7	26.4	23.5	59.6

Original value of 146 µg/L was excluded and replaced with the average May value for 1990-2000, which = 20 µg/L



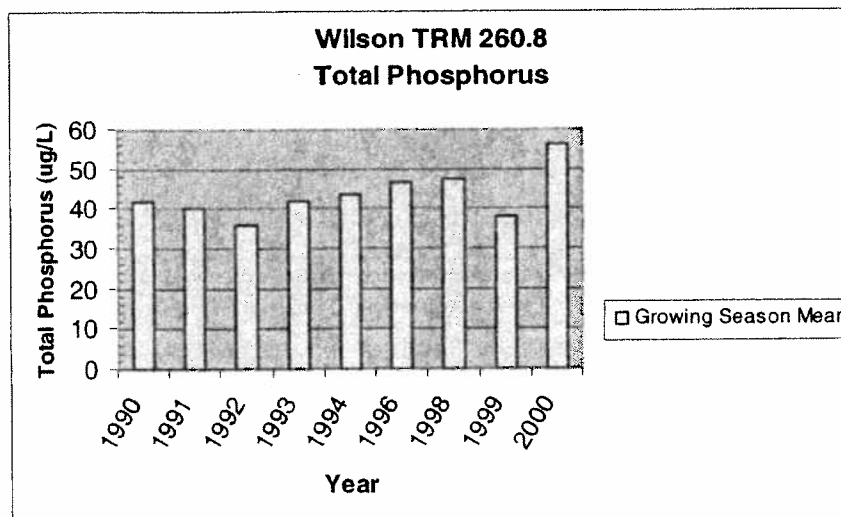
Appendix D—Data Analysis for Wilson Lake

Total Phosphorus Data

Year	Growing Season Mean (µg/L)	April	May	June	July	Aug.	Sept.	Growing Season TSI	TSI Classification	Annual Average Retention Time (days)
1990	41.7	60.0	40.0	60.0	20.0	20.0	50.0	57.9	eutrophic	
1991	40.0	50.0	60.0	30.0	20.0	40.0	40.0	57.3	eutrophic	
1992	32.5	20.0	15.0	50.0	30.0	40.0	40.0	54.3	eutrophic	
1993	42.0	no data	70.0	40.0	20.0	40.0	40.0	58.0	eutrophic	
1994	43.3	60.0	50.0	50.0	40.0	30.0	30.0	58.5	eutrophic	4.2
1996	46.7	50.0	no data	30.0	no data	60.0	no data	59.6	eutrophic	5.1
1998	47.5	50.0	no data	60.0	no data	40.0	40.0	59.8	eutrophic	5.6
1999	38.0	30.0	no data	40.0	40.0	40.0	40.0	56.6	eutrophic	7.9
2000	56.2	70.0	61.0	43.0	45.0	58.0	60.0	62.2	eutrophic	10.4

<i>Mean</i>	43.1	48.8	49.3	44.8	30.7	40.9	42.5	58.4
<i>Median</i>	42.0	50.0	55.0	43.0	30.0	40.0	40.0	58.0
<i>GeoMean</i>	42.6	45.7	44.4	43.5	29.0	39.1	41.7	58.3
<i>StdDev</i>	6.7	16.4	19.7	11.2	11.0	12.3	8.9	31.5
<i>25th%</i>	40.0	45.0	42.5	40.0	20.0	40.0	40.0	57.3
<i>50th%</i>	42.0	50.0	55.0	43.0	30.0	40.0	40.0	58.0
<i>75th%</i>	46.7	60.0	60.8	50.0	40.0	40.0	42.5	59.6
<i>90th%</i>	49.2	63.0	65.5	60.0	42.0	58.4	53.0	60.3
<i>95th%</i>	52.7	66.5	67.8	60.0	43.5	59.2	56.5	61.3

0.015 value thrown out

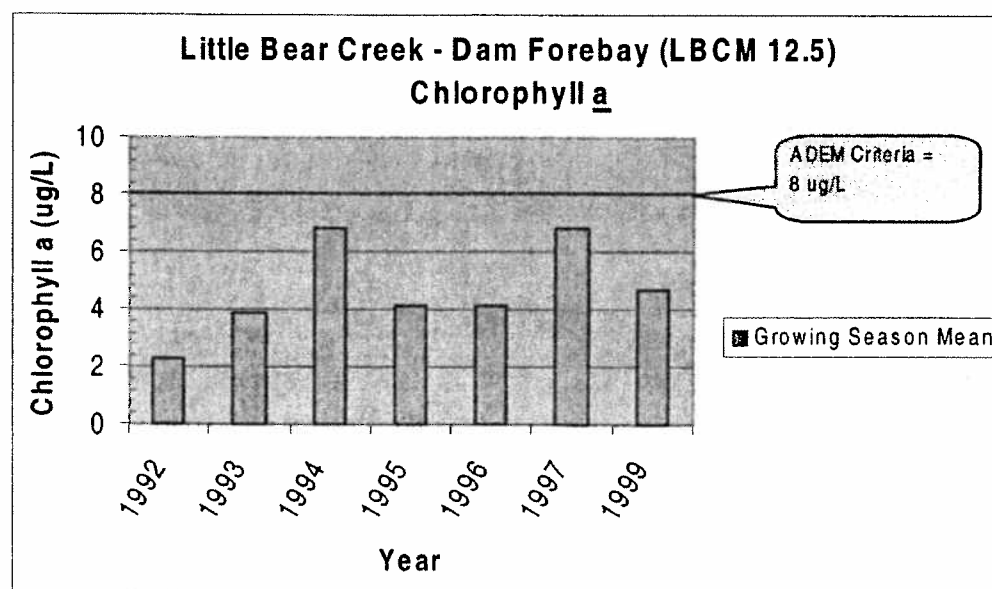


Appendix E—Data Analysis for Little Bear Creek Lake

Chlorophyll a Data

Year	Growing Season Mean (µg/L)	April	May	June	July	Aug.	Sept.	Oct.	Growing Season TSI	TSI Classification
1992	2.3	2	1	2	3	2	2	4	38.7	oligotrophic
1993	3.8	4	5	3	no data	7	2	2	43.8	mesotrophic
1994	6.9	9	14	11	3	3	4	4	49.5	mesotrophic
1995	4.2	4	5	7	3	3	no data	3	44.6	mesotrophic
1996	4.1	4	5	4	4	3	3	6	44.5	mesotrophic
1997	6.9	6	5	10	11	8	5	3	49.5	mesotrophic
1999	4.7	6	6	6	6	3	4	2	45.8	mesotrophic

<i>Mean</i>	4.7	5.0	5.9	6.1	5.0	4.1	3.3	3.4	45.8	mesotrophic
<i>Median</i>	4.2	4.0	5.0	6.0	3.5	3.0	3.5	3.0	44.6	mesotrophic
<i>GeoMean</i>	4.4	4.6	4.7	5.3	4.4	3.7	3.1	3.2	45.2	mesotrophic
<i>StdDev</i>	1.7	2.2	3.9	3.4	3.2	2.3	1.2	1.4	n/a	n/a
<i>25th%</i>	4.0	4.0	5.0	3.5	3.0	3.0	2.3	2.5	44.2	mesotrophic
<i>50th%</i>	4.2	4.0	5.0	6.0	3.5	3.0	3.5	3.0	44.6	mesotrophic
<i>75th%</i>	5.8	6.0	5.5	8.5	5.5	5.0	4.0	4.0	47.8	mesotrophic
<i>90th%</i>	6.9	7.2	9.2	10.4	8.5	7.4	4.5	4.8	49.5	mesotrophic
<i>95th%</i>	6.9	8.1	11.6	10.7	9.8	7.7	4.8	5.4	49.5	mesotrophic

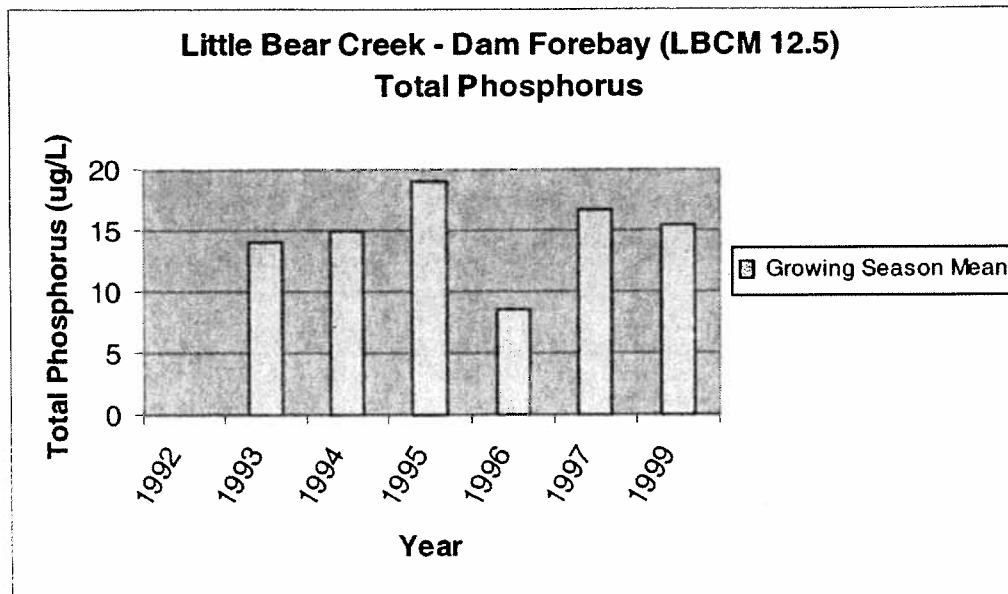


Appendix E—Data Analysis for Little Bear Creek Lake

Total Phosphorus Data

Year	Growing Season Mean (µg/L)	April	May	June	July	Aug.	Sept.	Oct.	Growing Season TSI	TSI Classification
1993	14.0	20.0				8.0			42.2	mesotrophic
1994	15.0	20.0				10.0			43.2	mesotrophic
1995	19.0	20.0		7.0		30.0			46.6	mesotrophic
1996	8.7	10.0		6.0		10.0			35.3	oligotrophic
1997	16.7	20.0		10.0		20.0			44.7	mesotrophic
1999	15.4	10.0	30.0	8.0	10.0	20.0	20.0	10.0	43.6	mesotrophic

<i>Mean</i>	14.8	16.7	30.0	7.8	10.0	16.3	20.0		43.0
<i>Median</i>	15.2	20.0	30.0	7.5	10.0	15.0	20.0		43.4
<i>GeoMean</i>	14.4	15.9	30.0	7.6	10.0	14.6	20.0		42.6
<i>StdDev</i>	3.5	5.2		1.7		8.5			22.0
<i>25th%</i>	14.3	12.5	30.0	6.8	10.0	10.0	20.0		42.5
<i>50th%</i>	15.2	20.0	30.0	7.5	10.0	15.0	20.0		43.4
<i>75th%</i>	16.4	20.0	30.0	8.5	10.0	20.0	20.0		44.4
<i>90th%</i>	17.8	20.0	30.0	9.4	10.0	25.0	20.0		45.7
<i>95th%</i>	18.4	20.0	30.0	9.7	10.0	27.5	20.0		46.2

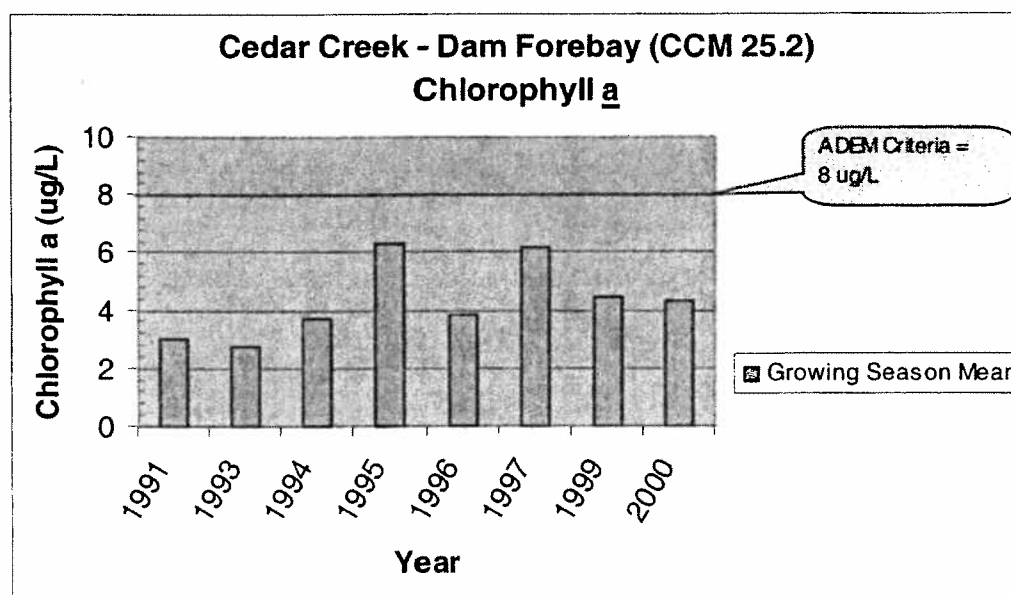


Appendix F—Data Analysis for Cedar Creek Lake

Chlorophyll a Data

Year	Growing Season Mean (µg/L)	April	May	June	July	Aug.	Sept.	Oct.	Growing Season TSI	TSI Classification
1991	3.0	6.0	5.0	2.0	3.0	2.0	1.0	2.0	41.4	mesotrophic
1993	2.7	2.0	5.0	4.0	2.0	2.0	2.0	2.0	40.4	mesotrophic
1994	3.7	6.0	7.0	2.0	3.0	3.0	2.0	3.0	43.5	mesotrophic
1995	6.3	15.0	11.0	5.0	2.0	2.0	no data	3.0	48.7	mesotrophic
1996	3.9	3.0	6.0	6.0	3.0	3.0	2.0	4.0	43.8	mesotrophic
1997	6.1	4.0	5.0	8.0	14.0	5.0	4.0	3.0	48.4	mesotrophic
1999	4.4	4.0	9.0	5.0	5.0	3.0	2.0	3.0	45.2	mesotrophic
2000	4.3	2.0	11.0	4.0	3.0	2.0	4.0	4.0	44.9	mesotrophic

<i>Mean</i>	4.3	5.3	7.4	4.5	4.4	2.8	2.4	3.0	44.9	mesotrophic
<i>Median</i>	4.1	4.0	6.5	4.5	3.0	2.5	2.0	3.0	44.4	mesotrophic
<i>GeoMean</i>	4.1	4.2	7.0	4.1	3.5	2.6	2.2	2.9	44.5	mesotrophic
<i>StdDev</i>	1.3	4.2	2.6	2.0	4.0	1.0	1.1	0.8	n/a	mesotrophic
<i>25th%</i>	3.5	2.8	5.0	3.5	2.8	2.0	2.0	2.8	43.0	mesotrophic
<i>50th%</i>	4.1	4.0	6.5	4.5	3.0	2.5	2.0	3.0	44.4	mesotrophic
<i>75th%</i>	4.9	6.0	9.5	5.3	3.5	3.0	3.0	3.3	46.1	mesotrophic
<i>90th%</i>	6.2	8.7	11.0	6.6	7.7	3.6	4.0	4.0	48.5	mesotrophic
<i>95th%</i>	6.3	11.9	11.0	7.3	10.9	4.3	4.0	4.0	48.6	mesotrophic

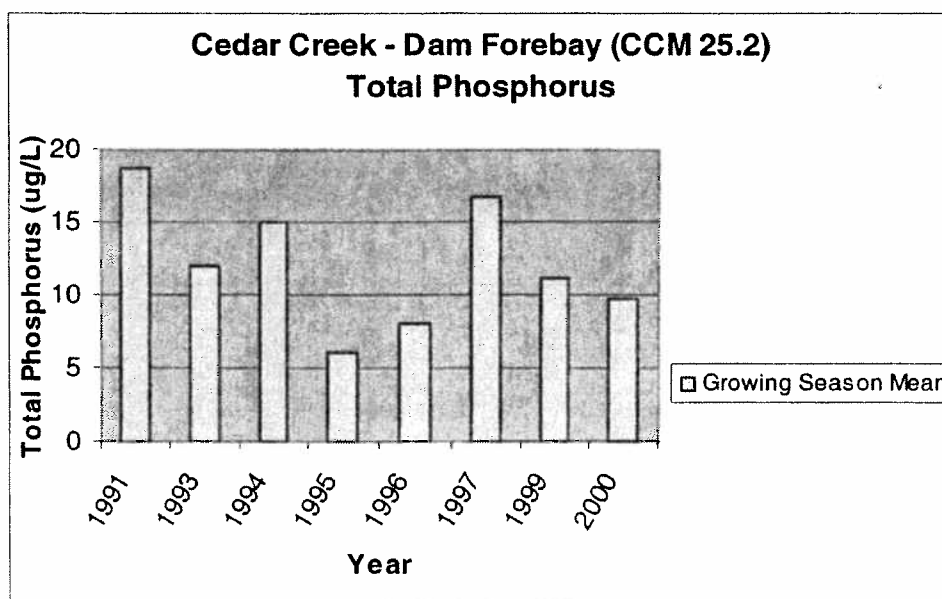


Appendix F—Data Analysis for Cedar Creek Lake

Total Phosphorus Data

Year	Growing Season Mean (µg/L)	April	May	June	July	Aug.	Sept.	Oct.	Growing Season TSI	TSI Classification
1991	18.7	60.0	30.0	9.0	10.0	4.0	8.0	10.0	46.4	mesotrophic
1993	12.0	20.0	no data	no data	no data	4.0	no data	no data	40.0	mesotrophic
1994	15.0	20.0	no data	no data	no data	10.0	no data	no data	43.2	mesotrophic
1995	6.0	10.0	no data	6.0	no data	2.0	no data	no data	30.0	oligotrophic
1996	8.0	10.0	no data	6.0	no data	8.0	no data	no data	34.1	oligotrophic
1997	16.7	20.0	no data	10.0	no data	20.0	no data	no data	44.7	mesotrophic
1999	11.1	9.0	10.0	8.0	5.0	6.0	20.0	20.0	38.9	oligotrophic
2000	9.7	3.0	16.0	19.0	5.0	10.0	10.0	5.0	36.9	oligotrophic

<i>Mean</i>	12.2	19.0	18.7	9.7	6.7	8.0	12.7	11.7	40.2
<i>Median</i>	11.6	15.0	16.0	8.5	5.0	7.0	10.0	10.0	39.5
<i>GeoMean</i>	11.4	13.8	16.9	8.9	6.3	6.5	11.7	10.0	39.3
<i>StdDev</i>	4.4	17.7	10.3	4.8	2.9	5.7	6.4	7.6	n/a
<i>25th%</i>	9.3	9.8	13.0	6.5	5.0	4.0	9.0	7.5	36.3
<i>50th%</i>	11.6	15.0	16.0	8.5	5.0	7.0	10.0	10.0	39.5
<i>75th%</i>	15.4	20.0	23.0	9.8	7.5	10.0	15.0	15.0	43.6
<i>90th%</i>	17.3	32.0	27.2	14.5	9.0	13.0	18.0	18.0	45.2
<i>95th%</i>	18.0	46.0	28.6	16.8	9.5	16.5	19.0	19.0	45.8



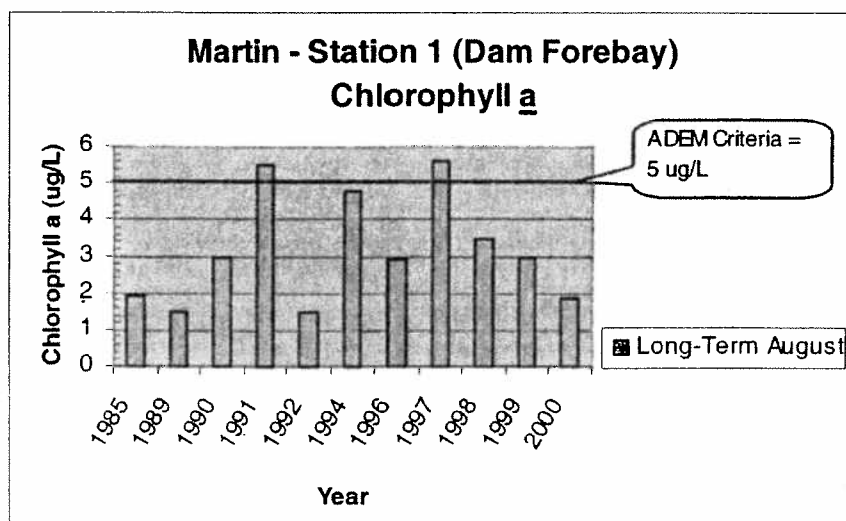
Appendix G—Data Analysis for Lake Martin

Chlorophyll a Data

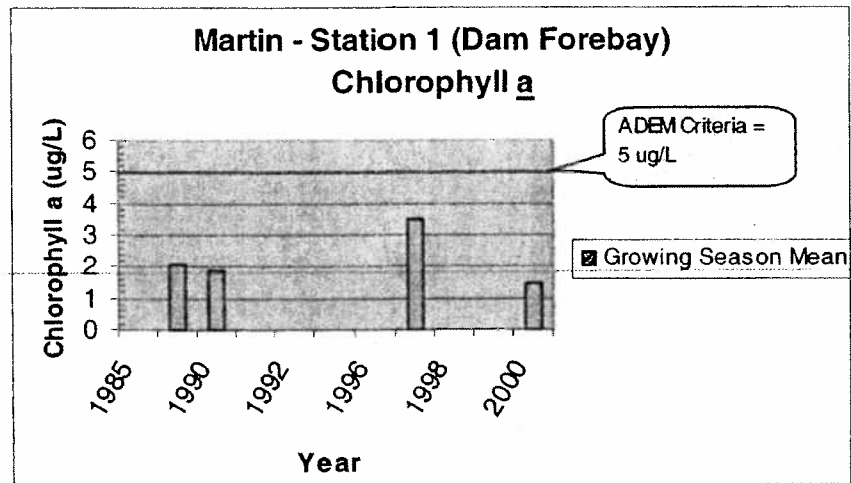
Year	Growing Season Mean (µg/L)	April	May	June	July	Aug.	Sept.	Oct.	Growing Season TSI	TSI Classification
1985	n/a	no data	no data	no data	no data	1.9	2.05	no data	n/a	n/a
1989	2.1	1.5	0.8	3.1	2.4	1.5	2.4	2.7	37.7	oligotrophic
1990	1.9	2.9	1.3	1.4	2.1	3.0	0.7	no data	37.0	oligotrophic
1991	n/a	no data	2.9	no data	no data	5.5	no data	no data	n/a	n/a
1992	n/a	1	no data	no data	no data	1.5	no data	no data	n/a	n/a
1994	n/a	2	no data	no data	no data	4.8		no data	n/a	n/a
1996	n/a	no data	no data	no data	no data	2.9	no data	no data	n/a	n/a
1997	3.5	2.1	2.1	2.7	4.8	5.6	3.7	no data	42.9	mesotrophic
1998	n/a	no data	no data	no data	no data	3.47	no data	no data	n/a	n/a
1999	n/a	no data	no data	no data	no data	3.00	no data	no data	n/a	n/a
2000	1.4	0.5	0.5	2.1	1.9	1.9	1.6	1.6	34.2	oligotrophic

Mean	2.2	1.7	1.5	2.3	2.8	3.2	2.1	2.2	38.5	oligotrophic
Median	2.0	1.8	1.3	2.4	2.3	3.0	2.1	2.2	37.4	oligotrophic
GeoMean	2.1	1.5	1.3	2.3	2.6	2.9	1.8	2.1	38.0	oligotrophic
StdDev	0.9	0.8	1.0	0.7	1.4	1.5	1.1	n/a	n/a	n/a
25th%	1.8	1.2	0.8	2.0	2.1	1.9	1.6	1.9	36.4	oligotrophic
50th%	2.0	1.8	1.3	2.4	2.3	3.0	2.1	2.2	37.4	oligotrophic
75th%	2.4	2.1	2.1	2.8	3.0	4.1	2.4	2.4	39.3	oligotrophic
90th%	3.1	2.5	2.6	3.0	4.1	5.5	3.2	2.6	41.6	mesotrophic
95th%	3.3	2.7	2.7	3.1	4.4	5.6	3.5	2.7	42.3	mesotrophic

* Water Quality Assessment of Alabama Public Lakes, ADEM 1989
Key Factors Study, ADEM/Auburn Univ. 1989, 1990, 1991.



Appendix G—Data Analysis for Lake Martin



Total Phosphorus Data

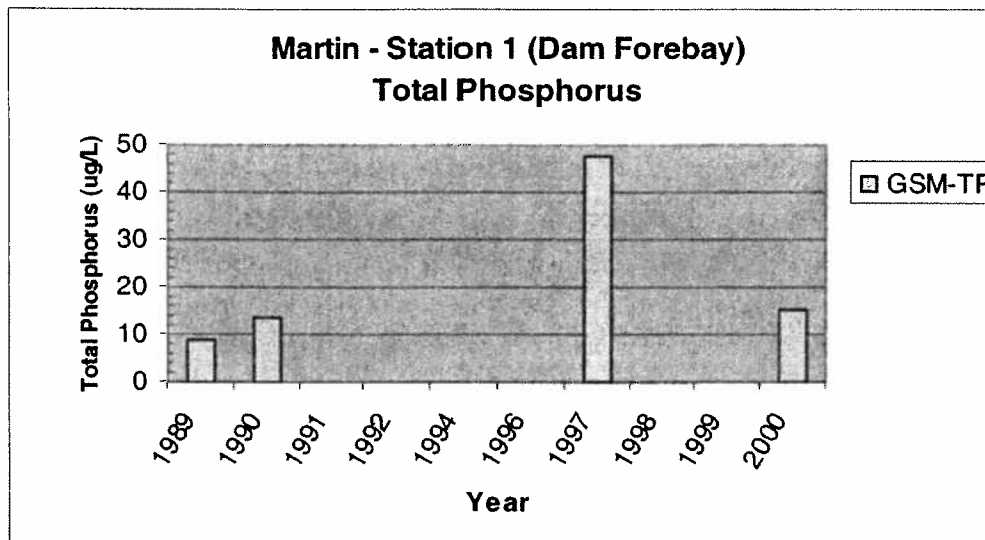
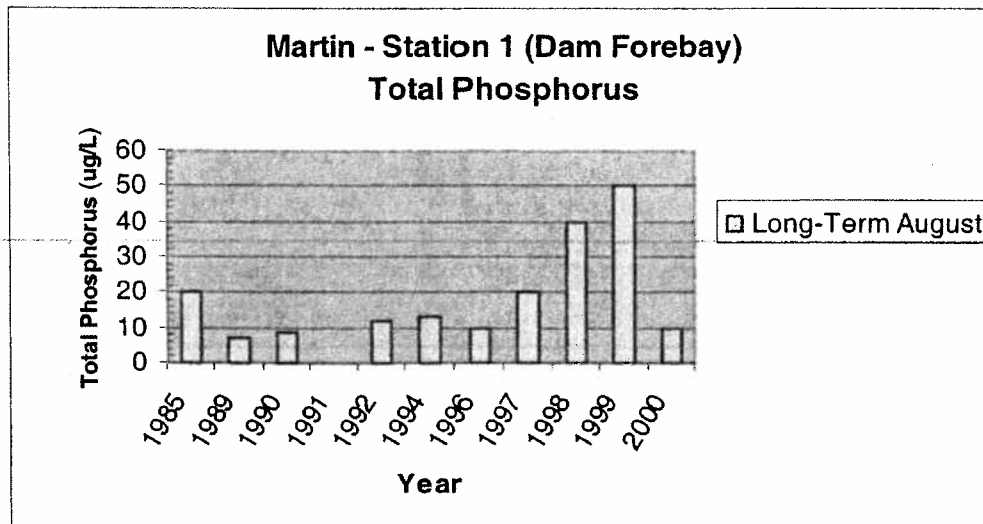
Year	Growing Season Mean (µg/L)	April	May	June	July	Aug.	Sept.	Oct.	Growing Season TSI	TSI Classification
1985	n/a	no data	no data	no data	no data	20.0	no data	no data	n/a	
1989	8.8	*320	7.0	3.0	16.0	7.0	11.0	no data	35.5	mesotrophic
1990	13.5	27.0	12.0	12.0	9.0	9.0	12.0	no data	41.7	mesotrophic
1991	n/a	6.0		no data	no data		no data	no data	n/a	
1992	n/a	9.0	no data	no data	no data	12.0	no data	no data	n/a	
1994	n/a	10.0	no data	no data	no data	13.0	no data	no data	n/a	
1996	n/a	no data	no data	no data	no data	10.0	no data	no data	n/a	
1997	47.5	60.0	60.0	15.0	90.0	20.0	40.0	no data	59.8	eutrophic
1998	n/a	no data	no data	no data	no data	40.0	no data	no data	n/a	
1999	n/a	no data	no data	no data	no data	50.0	no data	no data	n/a	
2000	15.1	40.0	2.0	2.0	2.0	10.0	10.0	40.0	43.3	mesotrophic

<i>Mean</i>	21.2	25.3	20.3	8.0	29.3	19.1	18.3	40.0	48.2
<i>Median</i>	14.3	18.5	9.5	7.5	12.5	12.5	11.5	40.0	42.5
<i>GeoMean</i>	17.1	18.1	10.0	5.7	12.7	15.5	15.2	40.0	45.1
<i>StdDev</i>	17.7	21.4	26.8	6.5	40.9	14.5	14.5	n/a	n/a
<i>25th%</i>	12.3	9.3	5.8	2.8	7.3	10.0	10.8	40.0	40.4
<i>50th%</i>	14.3	18.5	9.5	7.5	12.5	12.5	11.5	40.0	42.5
<i>75th%</i>	23.2	36.8	24.0	12.8	34.5	20.0	19.0	40.0	49.5
<i>90th%</i>	37.8	50.0	45.6	14.1	67.8	41.0	31.6	40.0	56.5
<i>95th%</i>	42.6	55.0	52.8	14.6	78.9	45.5	35.8	40.0	58.3

* (Reported value of 320 ug/L was not used) Water Quality Assessment of Alabama Public Lakes, ADEM 1989

Key Factors Study, ADEM/Auburn Univ. 1989, 1990, 1991.

Appendix G—Data Analysis for Lake Martin



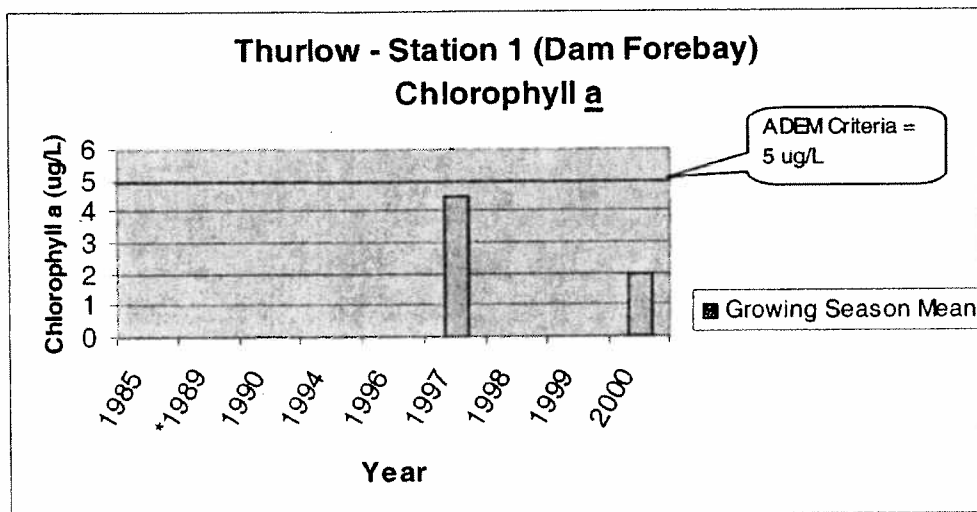
Appendix H—Data Analysis for Thurlow Lake

Chlorophyll a Data

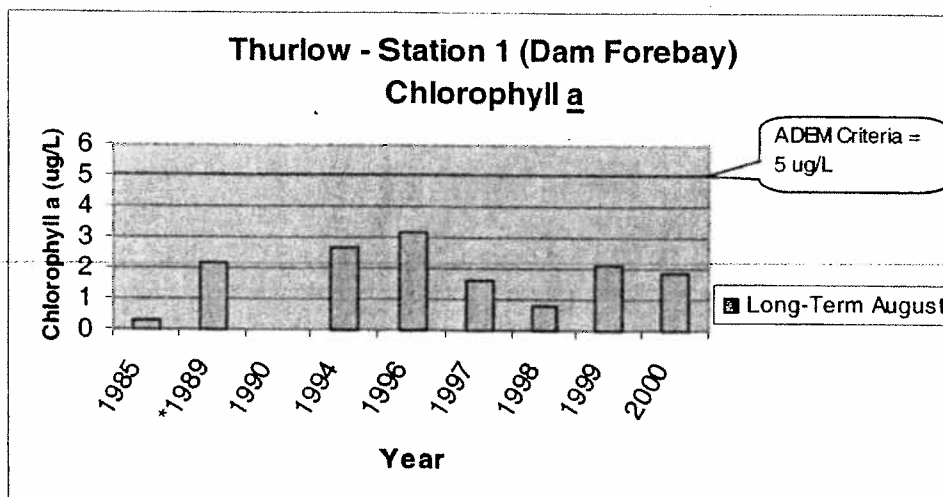
Year	Growing Season Mean (µg/L)	April	May	June	July	Aug.	Sept.	Oct.	Growing Season TSI	TSI Classification
1985	n/a	no data	no data	no data	no data	0.3	no data	no data	n/a	n/a
*1989	n/a	6.5	no data	no data	no data	2.2	no data	no data	n/a	n/a
1990	n/a	5	no data	no data	no data	??	no data	no data	n/a	n/a
1994	n/a	2	no data	no data	no data	2.7	no data	no data	n/a	n/a
1996	n/a	no data	no data	no data	no data	3.2	no data	no data	n/a	n/a
1997	4.45	9.61	4.54	1.07	2.67	1.60	7.21	no data	45.2	mesotrophic
1998	n/a	no data	no data	no data	no data	0.80	no data	no data	n/a	n/a
1999	n/a	no data	no data	no data	no data	2.10	no data	no data	n/a	n/a
2000	1.98	0.80	1.60	1.87	2.40	1.87	1.87	3.47	37.3	oligotrophic

Mean	3.2	4.8	3.1	1.5	2.5	1.8	4.5	3.5	42.1	mesotrophic
Median	3.2	5.0	3.1	1.5	2.5	2.0	4.5	3.5	42.1	mesotrophic
GeoMean	3.0	3.5	2.7	1.4	2.5	1.5	3.7	3.5	41.3	mesotrophic
StdDev	1.7	3.5	2.1	0.6	0.2	0.9	3.8	n/a	n/a	n/a
25th%	2.6	2.0	2.3	1.3	2.5	1.4	3.2	3.5	40.0	mesotrophic
50th%	3.2	5.0	3.1	1.5	2.5	2.0	4.5	3.5	42.1	mesotrophic
75th%	3.8	6.5	3.8	1.7	2.6	2.3	5.9	3.5	43.8	mesotrophic
90th%	4.2	8.4	4.2	1.8	2.6	2.9	6.7	3.5	44.7	mesotrophic
95th%	4.3	9.0	4.4	1.8	2.7	3.0	6.9	3.5	45.0	mesotrophic

* Water Quality Assessment of Alabama Public Lakes, ADEM 1989.



Appendix H—Data Analysis for Thurlow Lake



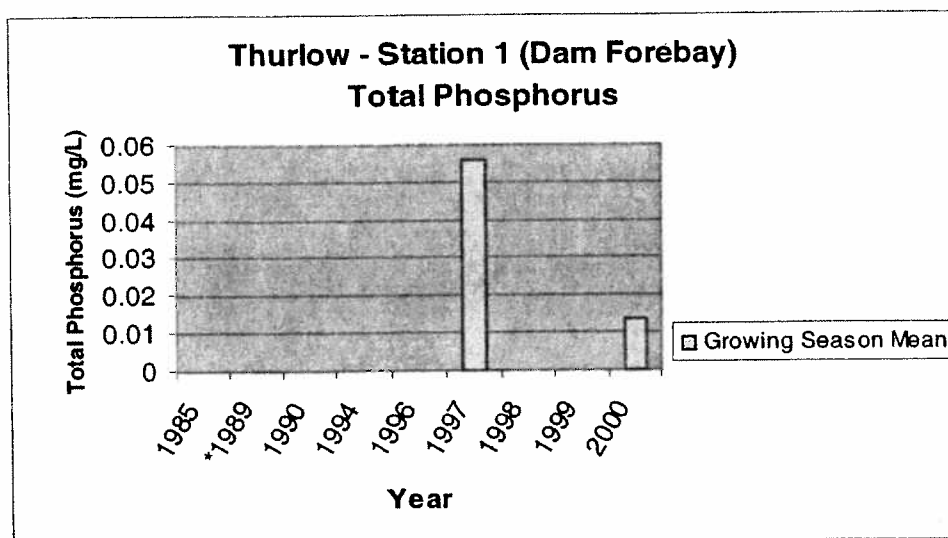
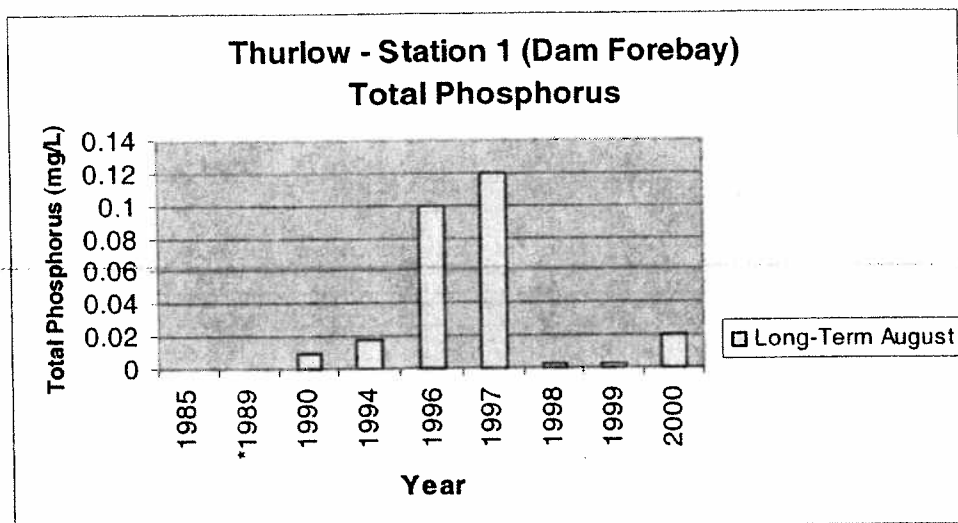
Total Phosphorus Data

Year	Growing Season Mean (µg/L)	April	May	June	July	Aug.	Sept.	Oct.	Growing Season TSI	TSI Classification
1985	n/a	no data	no data	no data	no data		no data	no data	n/a	n/a
*1989	n/a		no data	no data	no data		no data	no data	n/a	n/a
1990	n/a	0.010	no data	no data	no data	0.010	no data	no data	n/a	n/a
1994	n/a	0.008	no data	no data	no data	0.018	no data	no data	n/a	n/a
1996	n/a	no data	no data	no data	no data	0.100	no data	no data	n/a	n/a
1997	0.056	0.080	0.009	0.006	0.060	0.120	0.060	no data	n/a	mesotrophic
1998	n/a	no data	no data	no data	no data	0.002	no data	no data	n/a	n/a
1999	n/a	no data	no data	no data	no data	0.002	no data	no data	n/a	n/a
2000	0.014	0.040	0.002	0.002	0.002	0.020	0.020	0.010	n/a	oligotrophic

Mean	0.035	0.035	0.006	0.004	0.031	0.039	0.040	0.010
Median	0.035	0.025	0.006	0.004	0.031	0.018	0.040	0.010
GeoMean	0.028	0.022	0.004	0.003	0.011	0.015	0.035	0.010
StdDev	0.030	0.034	0.005	0.003	0.041	0.049	0.028	n/a
25th%	0.024	0.010	0.004	0.003	0.017	0.006	0.030	0.010
50th%	0.035	0.025	0.006	0.004	0.031	0.018	0.040	0.010
75th%	0.045	0.050	0.007	0.005	0.046	0.060	0.050	0.010
90th%	0.052	0.068	0.008	0.006	0.054	0.108	0.056	0.010
95th%	0.054	0.074	0.009	0.006	0.057	0.114	0.058	0.010

* Water Quality Assessment of Alabama Public Lakes, ADEM 1989.

Appendix H—Data Analysis for Thurlow Lake

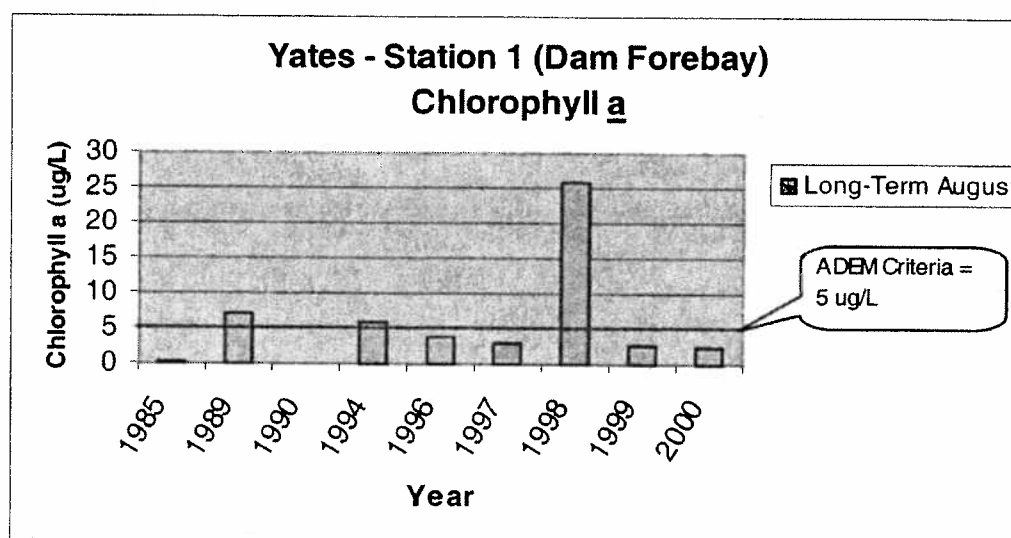


Appendix I—Data Analysis for Yates Lake

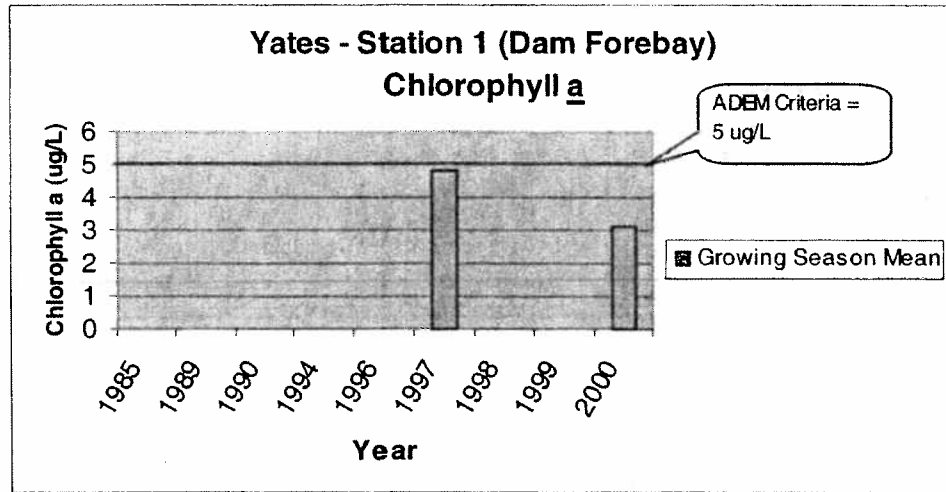
Chlorophyll a Data

Year	Growing Season Mean (µg/L)	April	May	June	July	Aug.	Sept.	Oct.	Growing Season TSI	TSI Classification
1985	n/a	no data	no data	no data	no data	0.4		no data	n/a	n/a
1989	n/a	2.2	no data	no data	no data	7.2	no data	no data	n/a	n/a
1990	n/a	2.0	no data	no data	no data		no data	no data	n/a	n/a
1994	n/a	3.0	no data	no data	no data	5.9	no data	no data	n/a	n/a
1996	n/a	no data	no data	no data	no data	3.7	no data	no data	n/a	n/a
1997	4.8	7.74	4.01	1.34	3.74	2.94	9.08	no data	46.0	eutrophic
1998	n/a	no data	no data	no data	no data	25.90	no data	no data	n/a	n/a
1999	n/a	no data	no data	no data	no data	2.70	no data	no data	n/a	n/a
2000	3.1	4.27	1.60	2.94	4.01	2.40	3.20	3.20	41.7	eutrophic

<i>Mean</i>	3.9	3.8	2.8	2.1	3.9	6.4	6.1	3.2	44.1	eutrophic
<i>Median</i>	3.9	3.0	2.8	2.1	3.9	3.3	6.1	3.2	44.1	eutrophic
<i>GeoMean</i>	3.9	3.4	2.5	2.0	3.9	3.6	5.4	3.2	43.8	eutrophic
<i>StdDev</i>	1.2	2.4	1.7	1.1	0.2	8.2	4.2	n/a	n/a	n/a
<i>25th%</i>	3.5	2.2	2.2	1.7	3.8	2.6	4.7	3.2	42.9	eutrophic
<i>50th%</i>	3.9	3.0	2.8	2.1	3.9	3.3	6.1	3.2	44.1	eutrophic
<i>75th%</i>	4.4	4.3	3.4	2.5	3.9	6.2	7.6	3.2	45.1	eutrophic
<i>90th%</i>	4.6	6.4	3.8	2.8	4.0	12.8	8.5	3.2	45.6	eutrophic
<i>95th%</i>	4.7	7.0	3.9	2.9	4.0	19.4	8.8	3.2	45.8	eutrophic



Appendix I—Data Analysis for Yates Lake

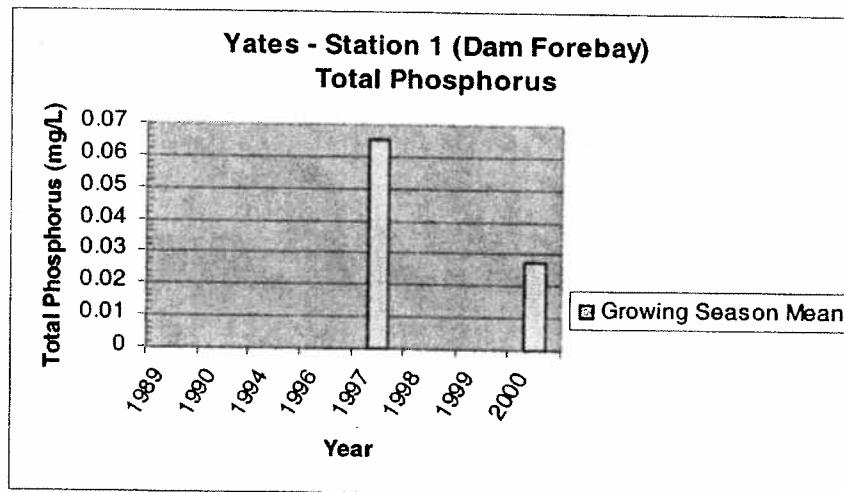
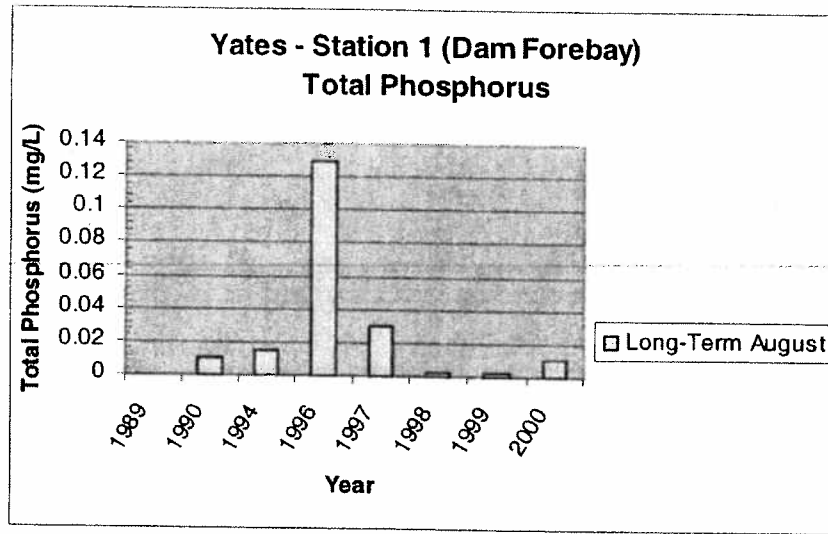


Total Phosphorus Data

Year	Growing Season Mean (µg/L)	April	May	June	July	Aug.	Sept.	Oct.	Growing Season TSI	TSI Class
1985	n/a	no data	no data	no data	no data	no data	no data	no data	n/a	n/a
1989	n/a	data excluded	no data	no data	no data	data excluded	no data	no data	n/a	n/a
1990	n/a	0.010	no data	no data	no data	0.010	no data	no data	n/a	n/a
1994	n/a	0.014	no data	no data	no data	0.015	no data	no data	n/a	n/a
1996	n/a	no data	no data	no data	no data	0.130	no data	no data	n/a	n/a
1997	0.065	0.090	0.060	0.020	0.130	0.030	0.060	no data	3.8	eutrophic
1998	n/a	no data	no data	no data	no data	0.002	no data	no data	n/a	n/a
1999	n/a	no data	no data	no data	no data	0.002	no data	no data	n/a	n/a
2000	0.027	0.040	0.007	0.021	0.020	0.011	0.040	0.050	-4.8	eutrophic

Mean	0.046	0.039	0.034	0.021	0.075	0.029	0.050	0.050
Median	0.046	0.027	0.034	0.021	0.075	0.011	0.050	0.050
GeoMean	0.042	0.027	0.020	0.020	0.051	0.011	0.049	0.050
StdDev	0.027	0.037	0.037	0.001	0.078	0.046	0.014	n/a
25th%	0.037	0.013	0.020	0.020	0.048	0.006	0.045	0.050
50th%	0.046	0.027	0.034	0.021	0.075	0.011	0.050	0.050
75th%	0.056	0.053	0.047	0.021	0.103	0.023	0.055	0.050
90th%	0.061	0.075	0.055	0.021	0.119	0.070	0.058	0.050
95th%	0.063	0.083	0.057	0.021	0.125	0.100	0.059	0.050

Appendix I—Data Analysis for Yates Lake



ATTACHMENT C- Revisions to 1200-4-3-.03(4)(j)
(revisions are shown in bold underline or bold strikeout)

Compound	Water & Organisms Criteria (ug/L)	Organisms Only Criteria (ug/L)
<u>INORGANICS</u>		
Antimony	5.6	640
Arsenic (c)	10.0	10.0
Mercury	0.05	0.051
Nickel	610	4600
Thallium	1.7 <u>0.24</u>	6.3 <u>0.47</u>
Cyanide	700 <u>140</u>	220000 <u>140</u>
Dioxin **	0.000001	0.000001
<u>VOLATILES</u>		
Acrolein	190	290
Acrylonitrile (c)	0.51	2.5
Benzene (c)	22	510
Bromoform (c)	43	1400
Carbon tetrachloride (c)	2.3	16
Chlorobenzene	680 <u>130</u>	21000 <u>1600</u>
Chlorodibromomethane (c)	4.0	130
Chloroform (c)	57	4700
Dichlorobromomethane (c)	5.5	170
1,2-Dichloroethane (c)	3.8	370
1,1-Dichloroethylene (e)	0.57 <u>330</u>	32 <u>7100</u>
1,2-Dichloropropane (c)	5.0	150
1,3-Dichloropropene (<u>c</u>)	10 <u>3.4</u>	1700 <u>210</u>
Ethylbenzene	3100 <u>530</u>	29000 <u>2100</u>
Methyl bromide	47	1500
Methylene chloride (c)	46	5900
1,1,2,2-Tetrachloroethane (c)	1.7	40
Tetrachloroethylene (c)	6.9	33
Toluene	6800 <u>1300</u>	200000 <u>15000</u>
1,2-Trans-Dichloroethylene	700 <u>140</u>	140000 <u>10000</u>
1,1,2-Trichloroethane (c)	5.9	160
Trichloroethylene (c)	25	300
Vinyl chloride (c)	20 <u>0.25</u>	5300 <u>24</u>
<u>ACID EXTRACTABLES</u>		
2-Chlorophenol	81	150
2,4-Dichlorophenol	77	290
2,4-Dimethylphenol	380	850
2-Methyl-4,6-dinitrophenol	13	280

2,4-Dinitrophenol	69	5300
Pentachlorophenol (c) (pH)	2.7	30
Phenol	21000	1700000
2,4,6-Trichlorophenol (c)	14	24
BASE NEUTRALS		
Acenaphthene	670	990
Anthracene	8300	40000
Benzidine (c)	0.00086	0.0020
Benzo(a)anthracene (c)	0.038	0.18
Benzo(a)pyrene (c)	0.038	0.18
Benzo(b)fluoranthene (c)	0.038	0.18
Benzo(k)fluoranthene (c)	0.038	0.18
Bis(2-Chlorethyl)ether (c)	0.30	5.3
Bis(2-Chloro-isopropyl)ether	1400	65000
Bis(2-Ethylhexyl)phthalate (c)	12	22
Butylbenzyl Phthalate	1500	1900
2-Chloronaphthalene	1000	1600
Chrysene (c)	0.038	0.18
Dibenz(a,h)Anthracene (c)	0.038	0.18
1,2-Dichlorobenzene	2700 420	17000 1300
1,3-Dichlorobenzene	320	960
1,4-Dichlorobenzene	400 63	2600 190
3,3-Dichlorobenzidine (c)	0.21	0.28
Diethyl phthalate	17000	44000
Dimethyl phthalate	270000	1100000
Di-n-butyl phthalate	2000	4500
2,4-Dinitrotoluene (c)	1.1	34
1,2-Diphenylhydrazine (c)	0.36	2.0
Fluoranthene	130	140
Fluorene	1100	5300
Hexachlorobenzene (c)	0.0028	0.0029
Hexachlorobutadiene (c)	4.4	180
Hexachlorocyclopentadiene	240 40	17000 1100
Hexachloroethane (c)	14	33
Ideno(1,2,3-cd)Pyrene (c)	0.038	0.18
Isophorone (c)	350	9600
Nitrobenzene	17	690
N-Nitrosodimethylamine (c)	0.0069	30
N-Nitrosodi-n-Propylamine (c)	0.05	5.1
N-Nitrosodiphenylamine (c)	33	60
Pyrene	830	4000
1,2,4-Trichlorobenzene	260 35	940 70

PESTICIDES		
Aldrin (c)	0.00049	0.00050
a-BHC (c)	0.026	0.049
b-BHC (c)	0.091	0.17
g-BHC - Lindane (e)	0.19 0.98	0.63 1.8
Chlordane (c)	0.0080	0.0081
4-4'-DDT (c)	0.0022	0.0022
4,4'-DDE (c)	0.0022	0.0022
4,4'-DDD (c)	0.0031	0.0031
Dieldrin (c)	0.00052	0.00054
a-Endosulfan	62	89
b-Endosulfan	62	89
Endosulfan Sulfate	62	89
Endrin	0.76 0.059	0.81 0.06
Endrin Aldehyde	0.29	0.30
Heptachlor (c)	0.00079	0.00079
Heptachlor epoxide (c)	0.00039	0.00039
PCB aroclors (e) (EPA 119-125)	0.00064	0.00064
PCB, total (c)	0.00064	0.00064
Toxaphene (c)	0.0028	0.0028

ATTACHMENT D –Antidegradation Language As Approved September 30, 2004

1200-4-3-.06 TENNESSEE ANTIDEGRADATION STATEMENT.

- (1) It is the purpose of Tennessee's standards to fully protect existing uses of all surface waters as established under the Act. Existing uses are those actually attained in the waterbody on or after November 28, 1975. In bodies of water identified as Tier I by the Division, existing uses will be maintained by application of the General Water Quality Criteria. In Tier I waters found to not meet water quality standards for a substance, new or increased discharges of that substance will not be allowed.

For substances or conditions not currently at or in violation of water quality standards, new or additional degradation will only be allowed if the applicant has demonstrated to the Department that reasonable alternatives to degradation are not feasible. Reasonable alternatives for discharges include, but are not limited to, connection to an existing collection system, land application, water reuse, or water recycling. For small domestic discharges, connection to an existing system or land application will be considered preferable.

The alternatives analysis shall be part of the application process and shall include a discussion of the feasibility, social and economic considerations, and environmental consequences of each potential alternative. Alternatives analyses shall include, at a minimum, completed and accurate Worksheets A and B for public sector applicants or Worksheets A and G for private system applicants, except where these worksheets are inappropriate for the activity, in which case applicants may substitute materials that provide equivalent information. These forms are found in the EPA guidance document entitled Interim Economic Guidance for Water Quality Standards: Workbook (EPA 823/B-95-002) (Economic Guidance).

For authorized new or expanded discharges, a record of the antidegradation determination(s) will be maintained and will be available for public review. Public participation will be provided in conjunction with permitting activities.

- (2) The Tennessee Water Quality Standards shall not be construed as permitting the degradation (See definition) of high quality surface waters. High quality waters are Tier II or Tier III. In Tennessee, Tier III waters are also referred to as Outstanding National Resource Waters (ONRWs). Characteristics of high quality waters include:

- (a) Waters that provide habitat for ecologically significant populations of aquatic or semi-aquatic plants or animals, including those proposed or listed for formal state or federal status.

- (b) Waters that provide specialized recreational opportunities related to existing water quality.

- (c) Waters that possess outstanding scenic or geologic values.

- (d) Waters where existing conditions exceed water quality standards.
- (3) (a) In other waters identified by the Department as Tier II high quality waters in accordance with 1200-4-3-.06(2), no degradation will be allowed unless and until it is affirmatively demonstrated to the Department, after full satisfaction of the following intergovernmental and public participation provisions, that a change is justified as a result of necessary economic or social development and will not interfere with or become injurious to any classified uses existing in such waters. At the time of permit renewal, previously authorized discharges, including upstream discharges, which presently degrade Tier II waters, will be subject to alternatives analysis, but not to a determination of economic/social necessity. Public participation for these existing discharges will be provided in conjunction with permitting activities. Sources exempted from permit requirements under the Water Quality Control Act should utilize all cost-effective and reasonable best management practices.
- (b) Determination of Economic/Social Necessity - Where reasonable alternatives to degradation to a Tier II stream are not feasible, applicants may ask the Department to determine that the proposed degradation is justified on the basis of economic or social necessity. The applicant shall have the burden of establishing to the Department that a change is justifiable as a result of necessary economic or social development and will not interfere with or become injurious to any classified uses existing in such waters. The Department's determination that degradation is justified or unjustified shall be subject to review by the Water Quality Control Board under the following procedures.
1. If the Department determines that degradation is justified, it will notify the applicant, the federal and state intergovernmental coordination agencies, and third persons who requested notification of the determination. Within 30 days after the date of the notification, any affected intergovernmental coordination agency or affected third person may petition the Board for a declaratory order under Tennessee Code Annotated § 4-5-223, and the Board shall convene a contested case. After the Board has convened a contested case in response to a declaratory order petition under this part, the Department shall within 5 business days thereafter transmit the petition to the Administrative Procedures Division of the Secretary of State so the contested case may be docketed and an administrative law judge may be assigned to the case. If a declaratory order petition is timely filed, the Department shall not proceed further in processing the permit application until the petition has been resolved before the Board. In the contested case, the petitioner shall have the burden of proof, and the Department's determination shall carry no presumption of correctness before the Board. The applicant is a necessary party to the declaratory order contested case, and if the applicant does not participate in the contested case, the Board shall render a decision that degradation is not justified. If no intergovernmental coordination agency or third person petitions for a

declaratory order within 30 days of the notification date, then the Department shall proceed with processing the permit application.

2. A declaratory order contested case conducted under this provision shall be subject to the following procedures. Mediation may occur if all the parties agree. Any proposed agreed order resulting from mediation shall be subject to approval by the Board. In order to provide for an expedited proceeding, the contested case is subject to the following time limitations. The time periods specified in this part shall commence on the day after the contested case has been docketed by the Administrative Procedures Division of the Secretary of State and an administrative law judge has been assigned to the case. Any alteration of the time periods set out in this part shall be granted only upon agreement of all the parties, or when there have been unforeseen developments that would cause substantial prejudice to a party, or when the parties have agreed to mediation. Within 20 days, the parties shall confer to try and develop a proposed agreed scheduling order. If the parties are unable to agree, then each party shall submit a proposed scheduling order, and the administrative law judge, after a hearing, shall enter a scheduling order. All discovery shall be completed no later than 20 days prior to the date the hearing before the Board is to begin. Within 120 days, the hearing before the Board shall begin, but the Board on its own initiative may exceed 120 days to complete the hearing and render its final decision. In order for degradation of Tier II waters to proceed pursuant to these rules, the Board must make a finding approving degradation by a majority vote of the members of the Board present and voting.
3. If the Department determines that degradation is not justified, it will notify the applicant, the federal and state intergovernmental coordination agencies, and third persons who requested notification of the determination. The Department also will issue a tentative decision to deny the permit because degradation is not justified. In accordance with 1200-4-1-.05(3), the Department will provide the public with notice of and an opportunity to comment on its tentative denial decision. If no public hearing is requested within the 30 day public comment period, and if the Department does not alter its tentative decision to deny, the Department shall notify the applicant of its final decision to deny the permit because degradation is not justified. Within 30 days after receiving notice of the final decision to deny the permit, the applicant may seek review of the decision in a contested case before the Board in accordance with Tennessee Code Annotated § 69-3-105(i). Within 5 business days after the Department receives an applicant's written request for a contested case hearing before the Board, the Department shall transmit the written request to the Administrative Procedures Division of the Secretary of State so the contested case may be docketed and an administrative law judge may be assigned to the case. In the contested case, the applicant shall have

the burden of proof, and the Department's determination shall carry no presumption of correctness before the Board. The federal and state intergovernmental coordination agencies, and third persons who requested notification of the Department's degradation determination will be notified by the Department of the applicant's permit appeal. The intergovernmental coordination agencies and third persons may seek to intervene in the contested case in accordance with Tennessee Code Annotated § 4-5-310.

(c) Information Requirements:

1. Applicants requesting an economic/social necessity determination to allow degradation under this provision must provide all information required in order for the Department to make a determination that reasonable alternatives to degradation are not feasible. Reasonable alternatives for discharges may include, but are not limited to, connection to an existing collection system, land application, water reuse, or water recycling. Applicants for permit renewals of previously authorized discharges, including upstream discharges, which presently degrade Tier II waters, shall submit as an alternatives analysis completed and accurate Worksheets A and B for public sector applicants or Worksheets A and G for private system applicants, except where these worksheets are inappropriate for the activity, in which case applicants may substitute materials that provide equivalent information. If needed, the Department may request the applicant to provide additional information. Alternatives analysis for new or additional degradation shall include, at a minimum, completed and accurate Worksheets A and B for public sector applicants or Worksheets A and G for private system applicants, except where these worksheets are inappropriate for the activity, in which case applicants may substitute materials that provide equivalent information. These forms are found in the EPA guidance document (Economic Guidance).
2. Additionally, to provide information to the Department regarding the applicant's claim of economic/social necessity, public sector applicants shall complete and submit, at a minimum, Forms O, P, Q, S, T, U, and AA, found in the EPA guidance document (Economic Guidance). Private sector applicants shall complete and submit, at a minimum, Forms O, R, V, W, X, Y, Z, and AB, found in the EPA guidance document (Economic Guidance). In instances when these worksheets are inappropriate for the activity, those applicants may substitute materials that provide equivalent information.

(d) Public Participation:

1. NPDES - Applicants seeking permission to degrade Tier II waters shall publish a notice in a newspaper of general distribution in the area of the degradation. The notice shall identify the proposed discharge, provide the specific location including affected waters, describe the general basis for

requesting permission to degrade Tier II waters, inform the public of their opportunity to provide comments, and that a local public meeting will be held by the Department unless the Department notifies the public of its determination that the discharge will not result in degradation. The applicant shall also post a sign within sight of a public road containing the same general information as the newspaper notice. A copy of the newspaper notice and proof of signage shall be provided to the Department. The public meeting held by the Department shall be near the proposed degradation.

2. ARAP/Section 401 Water Quality Certification - If the Department determines that an applicant's proposed activity will not result in degradation, it will so notify the public. If the Department determines that the proposed activity will degrade Tier II waters, and the applicant intends to seek permission to do so, then the applicant shall publish a notice in a newspaper of general distribution in the area of the degradation. The notice shall identify the proposed activity, provide the specific location including affected waters, describe the general basis for requesting permission to degrade Tier II waters, inform the public of their opportunity to submit comments, and that a local public meeting will be held by the Department. The public meeting held by the Department shall be near the proposed degradation.
3. Timing of Public Participation - Within 14 days of the Department being informed that an applicant will seek degradation, the applicant shall provide notice, as identified above, to the affected public. After the applicant provides public notice, the Department shall notify the public of the location, date and time of the public meeting in the area of degradation. Public notice by the Department shall occur at least 45 days prior to the meeting. For a proposed discharge, if the Department determines that the discharge will not result in degradation, it will so notify the public and in this circumstance, there will be no public meeting.

(e) Intergovernmental Coordination - A notice concerning the request for an economic/social necessity determination shall be provided by the Department to federal and state agencies with jurisdiction over fish, wildlife, shellfish, plant and wildlife resources, parks, and advisory councils for historic preservation.

- (4) The Department may recommend to the Water Quality Control Board that certain waterbodies be designated as Outstanding National Resource Waters (ONRWs). These shall be high quality waters which constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance.

Designation of ONRWs must be made by the Water Quality Control Board and will be accomplished in accordance with Section 69-3-105(a)(1) of the Tennessee Water Quality Control Act and through the appropriate rulemaking process.

In surface waters designated by the Water Quality Control Board as ONRWs, no new discharges, expansions of existing discharges, or mixing zones will be permitted unless such activity will not result in degradation of the water quality. Existing water quality will be the criteria in these waters. Physical alterations that cause degradation to the ONRW will not be allowed. At time of permit renewal, previously authorized discharges, including upstream discharges, which presently degrade an ONRW, will be subject to alternatives analysis. Public participation for these existing discharges will be provided in conjunction with permitting activities.

An assessment of environmental, economic, and social impacts will be prepared for each stream or stream segment proposed for Tier 3 ONRW designation. The assessment content and process will be determined by the Division of Water Pollution Control but will contain sufficient data and information to inform the Water Quality Control Board about environmental, economic, and social impact of ONRW designation. Further, the process will provide for comprehensive public participation with a solicitation of position statements from appropriate local government agencies including but not limited to county and municipal governments, Soil Conservation Districts, Utility Districts, as well as other local, state, and federal agencies that may have responsibility for land and water resource management within the watershed of the proposed stream segment.

The following streams or portions of streams are designated as ONRW:

WATERBODY PORTION DESIGNATED AS ONRW

- | | |
|-------------------------------------|--|
| (a) Little River | Portion within Great Smoky Mountains National Park. |
| (b) Abrams Creek | Portion within Great Smoky Mountains National Park. |
| (c) West Prong Little Pigeon River | Portion within Great Smoky Mountains National Park |
| (d) Little Pigeon River | From the headwaters within Great Smoky Mountains National Park to the downstream boundary of Pittman Center. |
| (e) Big South Fork Cumberland River | Portion within Big South Fork National River and Recreation Area. |
| (f) Reelfoot Lake | Tennessee portion of the lake and its associated wetlands. |

The portion of the Obed River that is designated as a federal wild and scenic river as of June 22, 1999 is designated as tier 3; provided however, that if the current search for a regional water supply by the Cumberland Plateau Regional Water Authority results in a

determination that it is necessary to utilize the Obed River as its source of drinking water, for that purpose the Obed shall be designated tier 2 and any permit issued for that project, whether state, federal, or otherwise, shall be considered under the requirements for tier 2.

- (5) All discharges of municipal sewage, industrial waste, or other wastes shall receive the greatest degree of effluent reduction which the Commissioner of the Tennessee Department of Environment and Conservation determines to be achievable through application of stringent effluent limitations and schedules of compliance either promulgated by the Water Quality Control Board; required to implement any applicable water quality standards, including where practicable, a standard permitting no discharge of pollutants; necessary to comply with a State Water Quality Plan; or necessary to comply with other State or Federal laws or regulations.
- (6) In implementing the provisions of these rules as they relate to interstate streams, the Commissioner of the Tennessee Department of Environment and Conservation and the Tennessee Water Quality Control Board will cooperate with the appropriate Federal Agency in order to assist in carrying out responsibilities under the Federal Water Pollution Control Act, as amended.

ATTACHMENT E –Antidegradation Language as Adopted October 24, 2006

1200-4-3-.06 Antidegradation Statement

- (1) It is the purpose of Tennessee's standards to fully protect existing uses of all surface waters as established under the Act. Existing uses are those actually attained in the waterbody on or after November 28, 1975. Additionally, the Tennessee Water Quality Standards shall not be construed as permitting the degradation (see definition) of high quality surface waters. Where the quality of Tennessee waters is better than the level necessary to support propagation of fish, shellfish, and wildlife, and recreation in and on the water, that quality will be maintained and protected unless the state finds, after intergovernmental coordination and public participation, that lowering water quality is necessary to accommodate important economic or social development in the area in which the waters are located.

Sources exempted from permit requirements under the Water Quality Control Act should utilize all cost-effective and reasonable best management practices. Activities that cause or contribute to non-compliance with a water quality standard will not be allowed. Activities proposed for waters that are not identified as either being Exceptional Tennessee Waters (1200-4-3-.06(4)) or Outstanding National Resource Waters (1200-4-3-.06(5)), will be evaluated on the basis of 1200-4-3-.06(2) and (3).

Where new or increased temperature alterations are proposed, a successful demonstration as determined by the state under Section 316(a) of the Clean Water Act, 33 U.S.C. §1326, shall be considered to be in compliance with this section.

- (2) Unavailable conditions exist where water quality is at, or fails to meet, the criterion for one or more parameters. In unavailable conditions, new or increased discharges of a substance that would cause or contribute to a condition of impairment will not be allowed. Where impairment by habitat alteration exists, additional significant loss of habitat within the same area of influence shall not be authorized unless avoidance, minimization, or in-system mitigation can render the impact *de minimis*.
- (3) Available conditions exist where water quality is better than the applicable criterion for a specific parameter. In available conditions, new or additional degradation for that parameter will only be allowed if the applicant has demonstrated to the department that reasonable alternatives to degradation are not feasible.
 - (a) Analysis of reasonable alternatives shall be part of the application process and shall include a discussion of the feasibility of all potential alternatives, plus the social and economic considerations and environmental consequences of each. Alternatives analyses shall include, at a minimum, completed and accurate Worksheets A and B for public sector applicants or Worksheets A and G for private system applicants, except where these worksheets are inappropriate for the activity, in which case applicants may substitute materials that provide equivalent information. These forms are found in the EPA guidance document entitled Interim Economic Guidance for Water Quality Standards: Workbook (EPA

823/B-95-002) (Economic Guidance). Reasonable alternatives for the various activities include, but are not limited to the following actions.

1. Alternatives for discharges include connection to an existing collection system, land application, water reuse, water recycling, or other treatment alternatives. For small domestic discharges, connection to an existing system or land application will be considered preferable.
 2. For water withdrawals, alternatives include water conservation, water reuse or recycling, off-stream impoundments, water harvesting during high flow conditions, regionalization, withdrawing water from a larger waterbody, use of ground water, connection to another water supply with available capacity, and pricing structures that encourage a reduction in consumption.
 3. For activities that cause habitat alterations, alternatives that minimize or avoid degradation should be explored and explained by the applicant. These avoidance or minimization activities could include maintaining or enhancing buffer zones, bridging a stream rather than culverting it, altering the footprint of a project instead of relocating a stream, or using a culvert without a bottom, instead of one that is fully concreted.
- (b) For authorized new or expanded discharges, a record of the antidegradation determination(s) will be maintained and will be available for public review. Public participation and intergovernmental coordination will be provided in conjunction with permitting activities.
- (4) (a) Exceptional Tennessee Waters are waters that are in any one of the following categories:
1. Waters within state or national parks, wildlife refuges, forests, wilderness areas, or natural areas;
 2. State Scenic Rivers or Federal Wild and Scenic Rivers;
 3. Federally-designated critical habitat or other waters with documented non-experimental populations of state or federally-listed threatened or endangered aquatic or semi-aquatic plants, or aquatic animals;
 4. Waters within areas designated as Lands Unsuitable for Mining pursuant to the federal Surface Mining Control and Reclamation Act where such designation is based in whole or in part on impacts to water resource values;
 5. Waters with naturally reproducing trout;

6. Waters with exceptional biological diversity as evidenced by a score of 40 or 42 on the Tennessee Macroinvertebrate Index (or a score of 28 or 30 in subecoregion 73a) using protocols found in TDEC's 2006 Quality System Standard Operating Procedure for Macroinvertebrate Stream Surveys, provided that the sample is considered representative of overall stream conditions; or
 7. Other waters with outstanding ecological, or recreational value as determined by the department. When application of this provision is a result of a request for a permit, such preliminary determination is to be made within 30 days of receipt of a complete permit application.
- (b) The department will maintain a list of waterbodies that have been reviewed and are known to have one or more of the above characteristics on its website and will make paper copies of that list available upon request.
- (c) In waters identified as Exceptional Tennessee Waters no degradation will be allowed unless and until it is affirmatively demonstrated to the Department, after full satisfaction of the following intergovernmental and public participation provisions, that a change is justified as a result of necessary economic or social development and will not interfere with or become injurious to any classified uses existing in such waters. At the time of permit renewal, previously authorized discharges, including upstream discharges, which presently degrade Exceptional Tennessee Waters, will be subject to a review of updated alternatives analysis information provided by the applicant, but not to a determination of economic/social necessity. Public participation for these existing discharges will be provided in conjunction with permitting activities. Sources exempted from permit requirements under the Water Quality Control Act should utilize all cost-effective and reasonable best management practices.
- (d) Determination of Economic/Social Necessity - Where reasonable alternatives to degradation to an Exceptional Tennessee Water is not feasible, applicants may ask the Department to determine that the proposed degradation is justified on the basis of economic or social necessity. The applicant shall have the burden of establishing to the Department that a change is justifiable as a result of necessary economic or social development and will not interfere with or become injurious to any classified uses existing in such waters. The Department's determination that degradation is justified or unjustified shall be subject to review by the Water Quality Control Board under the following procedures.
1. If the Department determines that degradation is justified, it will notify the applicant, the federal and state intergovernmental coordination agencies, and third persons who requested notification of the determination. Within 30 days after the date of the notification, any affected intergovernmental coordination agency or affected third person may petition the Board for a declaratory order under Tennessee Code Annotated § 4-5-223, and the

Board shall convene a contested case. After the Board has convened a contested case in response to a declaratory order petition under this part, the Department shall within 5 business days thereafter transmit the petition to the Administrative Procedures Division of the Secretary of State so the contested case may be docketed and an administrative law judge may be assigned to the case. If a declaratory order petition is timely filed, the Department shall not proceed further in processing the permit application until the petition has been resolved before the Board. In the contested case, the petitioner shall have the burden of proof, and the Department's determination shall carry no presumption of correctness before the Board. The applicant is a necessary party to the declaratory order contested case, and if the applicant does not participate in the contested case, the Board shall render a decision that degradation is not justified. If no intergovernmental coordination agency or third person petitions for a declaratory order within 30 days of the notification date, then the Department shall proceed with processing the permit application.

2. A declaratory order contested case conducted under this provision shall be subject to the following procedures. Mediation may occur if all the parties agree. Any proposed agreed order resulting from mediation shall be subject to approval by the Board. In order to provide for an expedited proceeding, the contested case is subject to the following time limitations. The time periods specified in this part shall commence on the day after the contested case has been docketed by the Administrative Procedures Division of the Secretary of State and an administrative law judge has been assigned to the case. Any alteration of the time periods set out in this part shall be granted only upon agreement of all the parties, or when there have been unforeseen developments that would cause substantial prejudice to a party, or when the parties have agreed to mediation. Within 20 days, the parties shall confer to try and develop a proposed agreed scheduling order. If the parties are unable to agree, then each party shall submit a proposed scheduling order, and the administrative law judge, after a hearing, shall enter a scheduling order. All discovery shall be completed no later than 20 days prior to the date the hearing before the Board is to begin. Within 120 days, the hearing before the Board shall begin, but the Board on its own initiative may exceed 120 days to complete the hearing and render its final decision. In order for degradation of Exceptional Tennessee Waters to proceed pursuant to these rules, the Board must make a finding approving degradation by a majority vote of the members of the Board present and voting.
3. If the Department determines that degradation is not justified, it will notify the applicant, the federal and state intergovernmental coordination agencies, and third persons who requested notification of the determination. The Department also will issue a tentative decision to deny the permit because degradation is not justified. In accordance with 1200-

4-1-.05(3), the Department will provide the public with notice of and an opportunity to comment on its tentative denial decision. If no public hearing is requested within the 30 day public comment period, and if the Department does not alter its tentative decision to deny, the Department shall notify the applicant of its final decision to deny the permit because degradation is not justified. Within 30 days after receiving notice of the final decision to deny the permit, the applicant may seek review of the decision in a contested case before the Board in accordance with Tennessee Code Annotated § 69-3-105(i). Within 5 business days after the Department receives an applicant's written request for a contested case hearing before the Board, the Department shall transmit the written request to the Administrative Procedures Division of the Secretary of State so the contested case may be docketed and an administrative law judge may be assigned to the case. In the contested case, the applicant shall have the burden of proof, and the Department's determination shall carry no presumption of correctness before the Board. The federal and state intergovernmental coordination agencies, and third persons who requested notification of the Department's degradation determination will be notified by the Department of the applicant's permit appeal. The intergovernmental coordination agencies and third persons may seek to intervene in the contested case in accordance with Tennessee Code Annotated § 4-5-310.

(e) Information Requirements:

1. Applicants requesting an economic/social necessity determination to allow degradation under this provision must provide all information required in order for the Department to make a determination that reasonable alternatives to degradation are not feasible. Reasonable alternatives for discharges may include, but are not limited to, connection to an existing collection system, land application, water reuse, water recycling, or other treatment alternatives. Applicants for permit renewals of previously authorized discharges, including upstream discharges, which presently degrade Exceptional Tennessee Waters, shall submit as an alternatives analysis completed and accurate Worksheets A and B for public sector applicants or Worksheets A and G for private system applicants, except where these worksheets are inappropriate for the activity, in which case applicants may substitute materials that provide equivalent information. If needed, the Department may request the applicant to provide additional information. Alternatives analysis for new or additional degradation shall include, at a minimum, completed and accurate Worksheets A and B for public sector applicants or Worksheets A and G for private system applicants, except where these worksheets are inappropriate for the activity, in which case applicants may substitute materials that provide equivalent information. These forms are found in the EPA guidance document (Economic Guidance).

2. Additionally, to provide information to the Department regarding the applicant's claim of economic/social necessity, public sector applicants shall complete and submit, at a minimum, Forms O, P, Q, S, T, U, and AA, found in the EPA guidance document (Economic Guidance). Private sector applicants shall complete and submit, at a minimum, Forms O, R, V, W, X, Y, Z, and AB, found in the EPA guidance document (Economic Guidance). In instances when these worksheets are inappropriate for the activity, those applicants may substitute materials that provide equivalent information.

(f) Public Participation:

1. NPDES - Applicants seeking permission to degrade Exceptional Tennessee Waters shall publish a notice in a newspaper of general distribution in the area of the degradation. The notice shall identify the proposed discharge, provide the specific location including affected waters, describe the general basis for requesting permission to degrade Exceptional Tennessee Waters, inform the public of their opportunity to provide comments, and that a local public meeting will be held by the Department unless the Department notifies the public of its determination that the discharge will not result in degradation. The applicant shall also post a sign within sight of a public road containing the same general information as the newspaper notice. A copy of the newspaper notice and proof of signage shall be provided to the Department. The public meeting held by the Department shall be near the proposed degradation.
2. ARAP/Section 401 Water Quality Certification - If the Department determines that an applicant's proposed activity will not result in degradation, it will so notify the public. If the Department determines that the proposed activity will degrade Exceptional Tennessee Waters, and the applicant intends to seek permission to do so, then the applicant shall publish a notice in a newspaper of general distribution in the area of the degradation. The notice shall identify the proposed activity, provide the specific location including affected waters, describe the general basis for requesting permission to degrade Exceptional Tennessee Waters, inform the public of their opportunity to submit comments, and that a local public meeting will be held by the Department. The public meeting held by the Department shall be near the proposed degradation.
3. Timing of Public Participation - Within 14 days of the Department being informed that an applicant will seek degradation, the applicant shall provide notice, as identified above, to the affected public. After the applicant provides public notice, the Department shall notify the public of the location, date and time of the public meeting in the area of degradation. Public notice by the Department shall occur at least 45 days

prior to the meeting. For a proposed discharge, if the Department determines that the discharge will not result in degradation, it will so notify the public and in this circumstance, there will be no public meeting.

- (g) Intergovernmental Coordination - A notice concerning the request for an economic/social necessity determination shall be provided by the Department to federal and state agencies with jurisdiction over fish, wildlife, shellfish, plant and wildlife resources, parks, and advisory councils for historic preservation.
- (5) The Department may recommend to the Water Quality Control Board that certain waterbodies be designated as Outstanding National Resource Waters (ONRWs). These shall be high quality waters which constitute an outstanding national resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance.

Designation of ONRWs must be made by the Water Quality Control Board and will be accomplished in accordance with Section 69-3-105(a)(1) of the Tennessee Water Quality Control Act and through the appropriate rulemaking process.

In surface waters designated by the Water Quality Control Board as ONRWs, no new discharges, expansions of existing discharges, or mixing zones will be permitted unless such activity will not result in measurable degradation of the water quality. Existing water quality will be the criteria in these waters. Physical alterations that cause degradation to the ONRW will not be allowed. At time of permit renewal, previously authorized discharges, including upstream discharges, which presently degrade an ONRW, will be subject to alternatives analysis. Public participation for these existing discharges will be provided in conjunction with permitting activities.

An assessment of environmental, economic, and social impacts will be prepared for each stream or stream segment proposed for ONRW designation. The assessment content and process will be determined by the department but will contain sufficient data and information to inform the Water Quality Control Board about environmental, economic, and social impact of ONRW designation. Further, the process will provide for comprehensive public participation with a solicitation of position statements from appropriate local government agencies including but not limited to county and municipal governments, Soil Conservation Districts, Utility Districts, as well as other local, state, and federal agencies that may have responsibility for land and water resource management within the watershed of the proposed stream segment.

The following streams or portions of streams are designated as ONRW:

WATERBODY	PORTION DESIGNATED AS ONRW
(a) Little River	Portion within Great Smoky Mountains National Park.

- | | |
|-------------------------------------|---|
| (b) Abrams Creek | Portion within Great Smoky Mountains National Park. |
| (c) West Prong Little Pigeon River | Portion within Great Smoky Mountains National Park upstream of Gatlinburg. |
| (d) Little Pigeon River | From the headwaters within Great Smoky Mountains National Park downstream to the confluence of Mill Branch. |
| (e) Big South Fork Cumberland River | Portion within Big South Fork National River and Recreation Area. |
| (f) Reelfoot Lake | Tennessee portion of the lake and its associated wetlands. |

The portion of the Obed River that is designated as a federal wild and scenic river as of June 22, 1999 is designated as ONRW, provided however, that if the current search for a regional water supply by the Cumberland Plateau Regional Water Authority results in a determination that it is necessary to utilize the Obed River as its source of drinking water, for that purpose the Obed shall be designated as an Exceptional Tennessee Water and any permit issued for that project, whether state, federal, or otherwise, shall be considered under the requirements for Exceptional Tennessee Waters.

- (6) All discharges of municipal sewage, industrial waste, or other wastes shall receive the greatest degree of effluent reduction which the Commissioner of the Tennessee Department of Environment and Conservation determines to be achievable through application of stringent effluent limitations and schedules of compliance either promulgated by the Water Quality Control Board; required to implement any applicable water quality standards, including where practicable, a standard permitting no discharge of pollutants; necessary to comply with a State Water Quality Plan; or necessary to comply with other State or Federal laws or regulations.
- (7) In implementing the provisions of these rules as they relate to interstate streams, the Commissioner of the Tennessee Department of Environment and Conservation and the Tennessee Water Quality Control Board will cooperate with the appropriate Federal Agency in order to assist in carrying out responsibilities under the Federal Water Pollution Control Act, as amended.

**Attachment F - Summary of Revisions Within Chapter 1200-4-4
(TS=Trout Stream, NRTS=Naturally Reproducing Trout Stream)**

Revisions to 1200-4-4-.04, .08-.11, and .13:

Basin Name / Stream Name	Description	Change Made	
		FROM	TO
<u>1200-4-4-.04 Tennessee River Basin - Western Valley</u>			
Hurricane Creek	Mile 0.0 to Origin	N/A	TS
<u>1200-4-4-.08 Upper Tennessee River Basin</u>			
Barrett Branch	Mile 0.0 to Origin	TS	NRTS
Service Branch	Mile 0.0 to Origin	TS	NRTS
McNabb Creek	Mile 0.0 to Origin	TS	NRTS
Laurel Branch of North River	Mile 0.0 to Origin	TS	NRTS
Service Tree Branch	Mile 0.0 to Origin	TS	NRTS
Panther Branch	Mile 0.0 to Origin	TS	NRTS
Mill Branch	Mile 0.0 to Origin	TS	NRTS
Flint Branch	Mile 0.0 to Origin	TS	NRTS
Crowder Branch	Mile 0.0 to Origin	TS	NRTS
Indian Valley Branch	Mile 0.0 to Origin	TS	NRTS
Panther Creek	Mile 0.0 to Origin	TS	NRTS
Mill Creek	Mile 0.0 to Origin	TS	NRTS
Rabbit Creek	Mile 0.0 to Origin	TS	NRTS
Hannah Branch	Mile 0.0 to Origin	TS	NRTS
Peckerwood Branch	Mile 0.0 to Origin	TS	NRTS
Bower Creek	Mile 0.0 to Origin	TS	NRTS
Ekanneetlee Branch	Mile 0.0 to Origin	TS	NRTS
Rowans Branch	Mile 0.0 to Origin	TS	NRTS
Shop Creek	Mile 0.0 to Origin	TS	NRTS
Tabcat Creek	Mile 0.0 to Origin	TS	NRTS
Bible Creek	Mile 0.0 to Origin	TS	NRTS
W.Prong Little R.	Mile 0.0 to Origin	TS	NRTS
Laurel Creek	Mile 0.0 to Origin	TS	NRTS
Meadow Br	Mile 0.0 to Origin	TS	NRTS
Spruce Flats Br	Mile 0.0 to Origin	TS	NRTS
Sams Creek	Mile 0.0 to Origin	TS	NRTS
Thunderhead Pr	Mile 0.0 to Origin	TS	NRTS
Shut-in Cr	Mile 0.0 to Origin	TS	NRTS
Lynn Camp Prong	Mile 0.0 to Origin	TS	NRTS
Marks Creek	Mile 0.0 to Origin	TS	NRTS
Meigs Creek	Mile 0.0 to Origin	TS	NRTS
Little Greenbriar Creek	Mile 0.0 to Origin	TS	NRTS
Mannis Branch	Mile 0.0 to Origin	TS	NRTS

**Attachment F - Summary of Revisions Within Chapter 1200-4-4
(TS=Trout Stream, NRTS=Naturally Reproducing Trout Stream)**

Blanket Creek	Mile 0.0 to Origin	TS	NRTS
Shields Branch	Mile 0.0 to Origin	TS	NRTS
Jakes Creek	Mile 0.0 to Origin	TS	NRTS
Newt Prong	Mile 0.0 to Origin	TS	NRTS
Laurel Branch of Little River	Mile 0.0 to Origin	TS	NRTS
Fish Camp Prong	Mile 0.0 to Origin	TS	NRTS
Goshen Prong	Mile 0.0 to Origin	TS	NRTS
Silers Prong	Mile 0.0 to Origin	TS	NRTS
Rich Branch	Mile 0.0 to Origin	TS	NRTS
Rough Creek	Mile 0.0 to Origin	TS	NRTS
Meigs Post Prong	Mile 0.0 to Origin	TS	NRTS
Grouse Creek	Mile 0.0 to Origin	TS	NRTS
<u>1200-4-4-.09 Clinch River Basin</u>			
Coal Creek	At Clinch River (Mile 75.0); Mile 0.0 to Origin	N/A	TS
<u>1200-4-4-.10 French Broad River Basin</u>			
Twomile Creek	Mile 0.0 to Origin	TS	NRTS
Fighting Creek	Mile 0.0 to Origin	TS	NRTS
Sugarland Branch	Mile 0.0 to Origin	TS	NRTS
Big Branch	Mile 0.0 to Origin	TS	NRTS
Road Prong	Mile 0.0 to Origin	TS	NRTS
Cole Branch	Mile 0.0 to Origin	TS	NRTS
Alum Cave Creek	Mile 0.0 to Origin	TS	NRTS
Walker Camp Pr	Mile 0.0 to Origin	TS	NRTS
Dunn Creek	Mile 0.0 to <u>Mile 15.8 Origin</u>	TS	TS
Dunn Creek	<u>Mile 15.8 to Origin</u>	N/A	NRTS
Mill Creek at South Indian Creek	Mile 0.0 to Origin	TS	NRTS
Tumbling Creek	Mile 0.0 to Origin	TS	NRTS
Sinking Creek	Mile 0.0 to 5.2	TS	NRTS
Indian Camp Creek	Mile 0.0 to Origin	TS	NRTS
Moss Camp Creek	Mile 0.0 to Origin	TS	NRTS
Deep Gap Creek	Mile 0.0 to Origin	TS	NRTS
<u>1200-4-4-.11 Holston River Basin</u>			
Watauga River	Mile 25.8 to 55.1 (N.C.-Tenn. Line)	TS	NRTS
Simerly Creek	Mile 0.0 to Origin	TS	NRTS
Shell Creek	Mile 0.0 to Origin	TS	NRTS
Cove Creek	Mile 0.0 to Origin	TS	NRTS
Buck Creek	At Doe River (Mile 20.9); Mile 0.0 to Origin	N/A	NRTS

**Attachment F - Summary of Revisions Within Chapter 1200-4-4
(TS=Trout Stream, NRTS=Naturally Reproducing Trout Stream)**

Mill Creek at Roan Creek	Mile 0.0 to Origin	TS	NRTS
Big Dry Run Creek	Mile 0.0 to Origin	TS	NRTS
Big Creek	Mile 0.0 to Origin	TS	NRTS
Sulphur Springs Branch	Mile 0.0 to Origin	TS	NRTS
Stillhouse Branch	Mile 0.0 to Origin	TS	NRTS
Parks Branch	Mile 0.0 to Origin	TS	NRTS
Johnson Branch	Mile 0.0 to Origin	TS	NRTS
Dry Branch	Mile 0.0 to Origin	TS	NRTS
1200-4-4-.13 Upper Cumberland River Basin			
Smith Fork Creek	Mile 0.0 to <u>Mile 3.0</u> Origin	N/A	TS
Smith Fork Creek	<u>Mile 3.0 to Origin</u>	N/A	N/A
Barren Fork River	Mile 4.5 to Origin	N/A	TS

N/A means a specific designation of either TS or NRTS was not previously identified, or a specific designation is not currently identified.

**Attachment F - Summary of Revisions Within Chapter 1200-4-4
(TS=Trout Stream, NRTS=Naturally Reproducing Trout Stream)**

Revisions to 1200-4-4.14:

1200-4-4.14 BARREN RIVER WATERSHED

<u>STREAM</u>		<u>DESCRIPTION</u>	<u>DOM</u>	<u>IWS</u>	<u>FAL</u>	<u>REC</u>	<u>LWW</u>	<u>IRR</u>	<u>NAV</u>	<u>TS</u>	<u>NRTS</u>
<u>West Fork Drakes Creek</u>		<u>Mile 33.0 (stateline) to Origin</u>			<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
	<u>Caney Fork Creek</u>	<u>Mile 0.0 to Origin</u>			<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
	<u>Dry Fork Creek</u>	<u>Mile 0.0 to Origin</u>			<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
<u>Middle Fork Drakes Creek</u>		<u>Mile 22.2 (stateline) to Origin</u>	<u>X</u>		<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
	<u>Sulphur Fork Creek</u>	<u>Mile 9.0 (stateline) to Origin</u>			<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
	<u>Dutch Creek</u>	<u>Mile 0.0 to Origin</u>			<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
<u>Trammel Creek</u>		<u>Mile 30.7 (stateline) to Origin</u>			<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
	<u>Little Trammel Creek</u>	<u>Mile 4.7 (stateline) to Origin</u>			<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
<u>Long Creek</u>		<u>Mile 14.6 (stateline) to Origin</u>			<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
	<u>West Fork Long Creek</u>	<u>Mile 0.0 to Origin</u>			<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
<u>Puncheon Creek</u>		<u>Mile 4.3 (stateline) to Origin</u>	<u>X</u>		<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
	<u>Unnamed Tributary</u>	<u>Mile 0.0 to Origin</u>			<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
	<u>(Adams Spring)</u>										
	<u>Little Puncheon Creek</u>	<u>Mile 0.0 to Origin</u>			<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
	<u>Spring Creek</u>	<u>Mile 0.0 to Origin</u>	<u>X</u>		<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
<u>Salt Lick Creek</u>		<u>Mile 4.7 (stateline) to mile 6.8</u>			<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
<u>Salt Lick Creek</u>		<u>Mile 6.8 to mile 9.9</u>			<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>		<u>X</u>	
<u>Salt Lick Creek</u>		<u>Mile 9.9 to Origin</u>			<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
	<u>Long Fork</u>	<u>Mile 4.5 (stateline) Origin</u>			<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
	<u>White Oak Creek</u>	<u>Mile 4.1 (stateline) to Origin</u>			<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
	<u>Long Hungry Creek</u>	<u>Mile 0.0 to Origin</u>			<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
<u>Line Creek</u>		<u>Mile 14.2 (stateline) to Origin</u>			<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
	<u>Trace Creek</u>	<u>Mile 0.0 to Origin</u>			<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
	<u>Little Trace Creek</u>	<u>Mile 0.0 to Origin</u>			<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			
<u>All other surface waters named and unnamed, within the Barren River Basin, with the exception of wet weather conveyances, which have not been specifically noted shall be classified</u>					<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>			

**ATTACHMENT G – December 3, 2007 Letter from James D. Giattina, Director, Region
4 Water Management Division, to Paul Davis, Director, Tennessee Division of Water
Pollution Control**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

DEC 03 2007

Mr. Paul Davis
Director
Division of Water Pollution Control
Tennessee Department of Environment
and Conservation
401 Church St.
Nashville, TN 37243

Dear Mr. Davis:

Based on our initial review of the revisions to the State's antidegradation policy and implementation methodology, we have several questions concerning how the State will implement the revised regulation. Although some of these questions have been discussed briefly with your staff, I ask that you provide a written response that generally addresses the issues raised in the questions listed below. We acknowledge that Tennessee is currently developing guidance for antidegradation that will describe more specifically how the state will implement the policy.

1200-4-3-.04(4)

This provision includes a reference to habitat alterations authorized by an ARAP permit. It provides that such changes are de minimis if the impacts are offset by a combination of impact minimization and/or in-system mitigation. Does the State ever issue ARAP permits involving habitat alteration in cases where the impacts may be considered to be greater than de minimis? In such cases, what additional analysis does the State undertake, in order to determine that issuance of the permit is necessary to accommodate important social and economic development in the area in which the water is located?

This provision also includes a reference to habitat alteration in situations where more than one activity may be authorized. The provision references total impacts on a percentage basis and indicates that total impacts using no more than 10 percent of available habitat (among other factors) are presumed to be de minimis. How does the State measure loss of habitat on a percentage basis? Is it related to area lost or specific features lost or some other factor or factors?

This provision states that degradation may be treated as de minimis even if more than 10 percent of the assimilative capacity, available habitat or 7Q10 flow has already been used, provided the State finds on a scientific basis, that the additional degradation has an insignificant effect on the resource and that no single activity is allowed to

consume more than 5 percent of the available habitat. Has the State developed the tests or review procedures it intends to use for each type of activity addressed in the regulation? Will de minimis determinations be documented during permit issuance processes and subject to public review? Will this procedure become a part of the State's water quality standards?

Since this provision is new, does the State have any record of past de minimis determinations relating to habitat alteration? It would be helpful if the State could provide an example of how this provision would be applied in a case involving proposed activity in waters with available conditions or in Exceptional Tennessee Waters. EPA would also appreciate clarification concerning the application of the terms "offset" and "in system mitigation", as set forth in the regulation. Could TDEC please provide such clarification?

What types of information or previous experiences in reviewing water withdrawal permits were used to establish levels of de minimis habitat alteration for activities that include water withdrawals?

1200-4-3-.06(1)

The last sentence states, "Where new or increased temperature alterations are proposed, a successful demonstration as determined by the state under Section 316(a) of the Clean Water Act, § 33 U.S.C. 1326, shall be considered to be in compliance with this section." To which section of State or federal law or regulation does the last phrase "with this section" refer?

1200-4-3-.06(2)

Section 1200-4-3-.06(2) addresses water bodies with unavailable conditions. The narrative in this section mentions how the State will address new or increased discharges to these waters as well as how additional habitat alterations are limited to a de minimis level in waters where impairment by habitat alteration exists. However, it does not directly deal with water withdrawals. Are there any conditions that would allow for proposed water withdrawals from water bodies with unavailable conditions, e.g., an allowance for additional de minimis withdrawals?

Also, this section includes the following, "Where impairment by habitat alteration exists, additional significant loss of habitat within the same area of influence shall not be authorized unless avoidance, minimization, or in-system can render the impact de minimis." Based on discussions with your staff, we understand that the inclusion of the word, "significant" in this sentence, was intended to mean the loss of habitat that occurs above and beyond a de minimis level of habitat loss. I ask that you confirm that interpretation or provide additional details as to the intent of the term as used here.

1200-4-3-.06(4)

Do the requirements in 1200-4-3-.06(3)(a) for evaluation of alternatives in waters with “available conditions” also apply for Exceptional Tennessee Waters, even though those requirements are not explicitly stated in the portion of the regulation that addresses Exceptional Tennessee Waters?

Antidegradation and Tennessee’s Permitting Processes

Does the Fact Sheet or Statement of Basis for a proposed NPDES permit include information as to which antidegradation category the receiving water falls into? Is this part of what the public then can comment on?

For waters where little or no ambient water quality information is available, how will the State make a determination that a receiving stream has either unavailable or available conditions? Once a determination is made that a receiving stream has unavailable conditions during the NPDES or other permitting processes, is that water body added to the CWA section 305(b) and/or 303(d) lists for the State?

Thank you for your assistance in providing clarification on these issues. If you have questions, please contact me at 404-562-9345 or Thomas McGill of my staff at 404-562-9243.

Sincerely,

A handwritten signature in black ink, appearing to read 'J. Giattina', with a long horizontal flourish extending to the right.

James D. Giattina
Director
Water Management Division

**ATTACHMENT H – February 27, 2008 Letter from Paul Davis, Director, Tennessee
Division of Water Pollution Control, to James D. Giattina, Director, EPA Region 4
Water Management Division**



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
6th floor - L&C Tower
401 Church Street
Nashville, Tennessee 37243-0437

February 27, 2008

James D. Giattina, Director
Water Management Division
Environmental Protection Agency, Region 4
Atlanta Federal Center
61 Forsyth Street
Atlanta, GA 30303-8960

Subject: **Tennessee's Antidegradation Statement**

Dear Mr. Giattina:

I am in receipt of your December 3, 2007, letter requesting a written response to questions regarding Tennessee's revisions to its antidegradation rule. We are happy to provide this information

As you know, the state is developing a guidance document that will address the issues that you've raised in more detail. Tennessee's specific implementation procedures will be incorporated into that document as opposed to state rules. This approach is similar to that of EPA, in that the detailed procedures are outlined in a guidance document rather than in the federal regulations.

1200-4-3-.04(4)

The state allows some habitat alterations that are considered to be greater than *de minimis*. In these cases, the state compares the resource value to the socioeconomic benefit associated with the alteration when considering authorization of the activity. Previously this process included an alternatives analysis, but the new standards will result in a more robust analysis. An example of such an evaluation is attached.

Tennessee rules require that any applicant evaluate alternatives such as in-system mitigation and avoidance which could render the degradation *de minimis* in effect. The applicant's evaluations must consider the resource value and the incremental socioeconomic impact associated with any additional project costs that result from non-degrading alternatives.

When evaluating applications for physical alterations in streams with available conditions or in Exceptional Tennessee Waters, the state will use the area of impact and activity type as a basis for determining whether the activity will consume more than 5 % of the available habitat. We will evaluate

whether the stream has already reached or exceeded the cumulative *de minimis* cap (10%) with a combination of tools such as direct measurements, GIS, databases of previously permitted activities, computer models, remote sensing (aerial photographs or satellite imagery), plus knowledge of the watershed. As with cases where 10 % of the assimilative capacity or 7Q10 has been used, a *de minimis* determination could be made if the impact of the additional discharge, habitat loss, or water withdrawal was shown by modeling, mass balance, or other scientific method to be too small to be measured.

De minimis determinations will be part of the permit record. For NPDES permits, the public will have the opportunity to review the determinations during the public comment period. For ARAP permits, the public notice process occurs upon receipt of a complete permit application and prior to development of a draft permit. The material for review at that time would include the permit application and the state's preliminary *de minimis* determination. For those permits, the public would have an opportunity to review and object to (via 3rd party appeal rights), the *de minimis* determinations during the 30 days subsequent to permit issuance.

With regard to water withdrawals, the state considers the source stream's resource value, the natural flow fluctuation characteristics of the source stream, the hydrologic requirements of aquatic ecosystems as well as the public value associated with the activity. The attached permit and notice of determination for the City of Franklin, Tennessee, water withdrawal permit provides an example of the state's evaluation process.

1200-4-3-.06(1)

The section to which that sentence refers is all of 1200-4-3-.06. However, certain waters have a greater resource value or more sensitive aquatic life and therefore would have to meet a higher standard in order to make a successful demonstration of what would assure the protection and propagation of the aquatic population.

1200-4-3-.06(2)

With respect to discharges into waters with unavailable conditions, the state will adhere to the Impaired Waters Permit Strategy, developed by TDEC and approved by EPA. In the case of water withdrawals, the division will consider whether or not the withdrawal will have any impact on the cause of impairment for waters with unavailable conditions. For example, a withdrawal may not have any effect on a water that is impaired for a particular pollutant. In that case, the withdrawal would not be considered *de minimis*, but more like a situation where a discharge of one pollutant could be allowed in a water impaired for another pollutant.

In the context of habitat impairment, the state would not authorize an activity beyond *de minimis*.

1200-4-3-.06(4)

An analysis of alternatives is required for Exceptional Tennessee Waters. This is the clear implication of both 1200-4-3-.06(4)(c) and (d). It would not make sense to state the special case for existing discharges in (4)(c) if analysis of alternatives were not required. This analysis would be satisfied by meeting the requirements of 1200-4-3-.06(3)(a), but the department could accept other types of alternatives analysis.

Antidegradation and Tennessee's Permitting Processes

The NPDES permit rationale does include information on the water quality status of the receiving water. The public can certainly comment upon the division's basis for setting permit limitations and standards.

Where no water quality data exists for a receiving stream, the division presumes that the water has available conditions and any applicant must meet the requirements of 1200-4-3-.06(3). For new or expanded discharges or activities, the division uses the criteria in 1200-4-3-.06(4)(a) to determine whether or not the water is considered an Exceptional Tennessee Water. The division determines whether or not a water is impaired based upon available ambient water quality monitoring data. Streams that are found to be impaired are added to the 303(d) list at the time of update. Of course, any antidegradation determinations would be made based on the actual impairment status as opposed to a 303(d) listing.

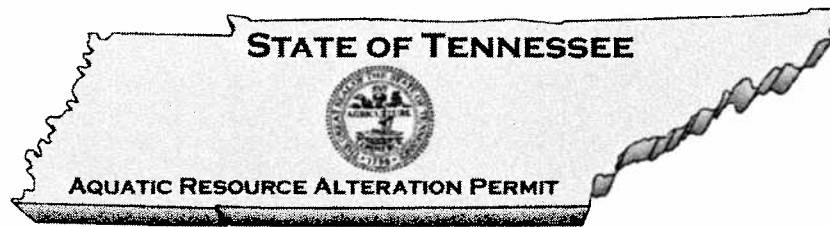
I trust that this information provides you the necessary detail for you review and approval of Tennessee's Water Quality Standards. Should you have any questions, please contact me at 615-532-0632 or Saya Qualls at 615-532-0652.

Sincerely,



Paul Estill Davis, P.E.
Director
Division of Water Pollution Control

enclosure



NRS06.332

Pursuant to the *Tennessee Water Quality Control Act of 1977* (T.C.A. § 69-3-101 et seq.) and supporting regulations, the Division of Water Pollution Control is required to determine whether the activity described below will violate applicable water quality standards.

Subject to conformance with accepted plans, specifications and other information submitted in support of the application, the state of Tennessee hereby authorizes the activity described below.

PERMITEE: City of Franklin
405 Hillsboro Road
Franklin, Tennessee 37064

AUTHORIZED WORK: involves a modification to the rate and volume of water withdrawn from the Harpeth River for municipal water supply by the City of Franklin. The water that is withdrawn from the river is used to fill an off stream reservoir from which it is pumped to the treatment plant when needed. The authorized work includes an increase in the pump capacity to 7,800 gpm or 11.2 mgd.

LOCATION: Harpeth River in Franklin, Williamson County; 35.9087°N, 86.8540°W

EFFECTIVE DATE: November 28, 2007

EXPIRATION DATE: November 27, 2012

SPECIAL CONDITIONS:

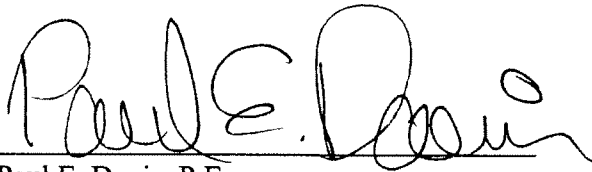
- 1) Flow in the Harpeth River shall not be reduced below ten cubic feet per second (cfs) as a result of the withdrawal. This limit applies to all current and future withdrawals subject to this permit.
- 2) Water shall be withdrawn at a rate of no more than twenty percent (20%) of the flow in the river at the intake.
- 3) The permittee shall investigate and report the feasibility of removing the low-head dam associated with the existing intake. The purpose of the feasibility study is to evaluate the costs and benefits for the restoration of water quality and fisheries ecosystem in the Harpeth River.
 - a) The feasibility study shall be coordinated with the department to allow stakeholder participation,
 - b) If the study shows that removal of the dam is feasible, then the city shall remove the dam in association with construction of the upgraded intake.

- 4) Prior to construction of the upgraded intake:
 - a) the feasibility study shall be completed and submitted to the department,
 - b) plans for the upgraded intake and dam removal must be submitted to the department and approved in writing,
 - c) the plans must address the mechanism by which water would be withdrawn at the rate of 20% of the total flow and how flow would be accurately measured.

GENERAL CONDITIONS:

- 1) The work shall be accomplished in conformance with the accepted plans, specifications, data and other information submitted in support of the above application and the limitations, requirements and conditions set forth herein.
- 2) Impacts to waters of the state other than those specifically addressed in the plans and this permit are prohibited. All streams, springs and wetlands shall be fully protected prior, during and after construction until the area is stabilized. Any questions, problems or concerns that arise regarding any stream, spring or wetland either before or during construction, shall be addressed to the Division of Water Pollution Control, Nashville Environmental Field Office 615-687-7020. Wetlands outside of the proposed area of impact shall not be used as storage or staging areas for equipment.
- 3) All work shall be carried out in such a manner as will prevent violations of water quality criteria as stated in Rule 1200-4-3-.03 of the Rules of The Tennessee Department of Environment and Conservation. This includes but is not limited to the prevention of any discharge that causes a condition in which visible solids, bottom deposits, or turbidity impairs the usefulness of waters of the state for any of the uses designated by Rule 1200-4-4. These uses include fish and aquatic life, livestock watering and wildlife, recreation, irrigation, industrial water supply, domestic water supply and navigation.
- 4) Appropriate steps shall be taken to ensure that petroleum products or other chemical pollutants are prevented from entering waters of the state. All spills must be reported to the appropriate emergency management agency, and measures shall be taken immediately to prevent the pollution of waters of the state, including groundwater.
- 5) Adverse impact to formally listed state or federal threatened or endangered species or their critical habitat is prohibited.
- 6) This permit does not authorize impacts to cultural, historical or archeological features or sites.
- 7) It is the responsibility of the applicant to convey all terms and conditions of this permit to all contractors. A copy of this permit, accepted plans, and any other documents pertinent to the activities authorized by this permit shall be maintained on site at all times during periods of construction activity.
- 8) This does not preclude requirements of other federal, state or local laws.

An appeal of this action may be made to the Water Quality Control Board. In order to appeal, a petition requesting a hearing before the Board must be filed within 30 days after receipt of the permit. In such petition, each contention should be stated in numbered paragraphs that describe how the proposed activity would be lawful and the action of the state is inappropriate. The petition must be prepared on 8½" x 11" paper, addressed to the Water Quality Control Board and filed in duplicate at the following address: Paul E. Davis, Director, Division of Water Pollution Control, 6th Floor L & C Annex, 401 Church Street, Nashville, Tennessee 37243-1534. Any hearing would be in accordance with Tennessee Code Annotated Section 69-3-110 and 4-5-301 et seq.

A handwritten signature in black ink, appearing to read "Paul E. Davis", written over a horizontal line.

Paul E. Davis, P.E.

Director, Division of Water Pollution Control

Tennessee Division of Water Pollution Control's Impaired Waters Permitting Strategy

This document describes the Division's strategy for permitting discharges to impaired streams. Provisions contained in 40 CFR Part 122.4(d), 122.4(i) and 122.44(d) prohibit any delegated NPDES authority from issuing permits that would cause or contribute to a violation of a water quality standard; or further degrade an already impaired water.

For reissued permits, the Division will allow permittees to continue discharging at current, permitted levels. For new or modified permits, the Division will allow only non-significant increases. To accomplish this, the Division will follow the procedure outlined below when considering individual municipal, domestic and industrial (non-stormwater) permits. It should be noted that these types of discharges are not anticipated to contribute to impairment due to siltation and/or habitat loss.

1. Determine whether or not the stream is impaired. (check most recent 303(d) list and/or 305(b) report and then double check with the Environmental Assistance Centers, and Planning and Standards)
2. Identify the causes of impairment. (i.e., metals, organic enrichment, etc.)
3. Review permit file, application, past data, data from similar facilities or literature to identify any pollutants which might add to the impairment.
4. For impairment due to organic enrichment and/or low D.O., use water quality models to determine if the proposed discharge will cause a significant reduction in instream D.O. concentration or a significant increase in organic loading. Using impaired background conditions, run the model at current flows and loadings and then at the proposed flow and loadings. Compare the resulting instream D.O. profiles. An instream D.O. depression (if any) of less than or equal to 10 % is acceptable.
5. For impairment due to nutrients* and new or expanded discharges from STPs, set limits for total Nitrogen and/or total Phosphorous at levels based current loading or on current nutrient removal practices. N and P monitoring may be necessary for determining current loading. For other discharges, include monitoring for N and P in the permit.
6. For metals and/or toxics, determine if the discharge could be limited in such a way that it would cause an increase in instream concentration that could not be measured. If that is not possible, allow the discharge with end of pipe limits equal to the water quality criterion.
7. For impairment due to pathogens, follow the Division's policy of setting the end of pipe limits equal to the water quality standard. When permitting, discharges from authorized CSOs, require that the permittees with CSOs address bacteriological contamination in their Long Term Control Plans.

* For impairment due to nutrients, the Division proposes a flexible approach. Historically, Total N and total P have not been limited or monitored. Therefore, effluent data is very limited. However, watershed modeling indicates that point sources are all at least theoretically insignificant. Field observation, however, indicates impacts attributable to STP discharges.

The Division generally believes that compliance with its stormwater permits (MS4, TMSP, Construction) will not result in significant increases in silt, organic enrichment, nutrients and metal/toxic levels. For the TMSP, the Division may add monitoring requirements as necessary to ensure further protection. For the Construction Permit, the Division is requiring additional oversight of sites located on impaired water bodies to ensure compliance with the permit and protection of the receiving stream.

The Class II CAFO General Permit is designed to specifically address streams impaired due to animal wastes. This permit covers all new or expanding CAFOs. Compliance with the permit should prevent further degradation of listed waters.



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
Division of Water Pollution Control
7th Floor Life and Casualty Annex
401 Church Street
Nashville, Tennessee 37243

July 6, 2007

Mr. Sandro Scola
Senior Manager, Structures
Southern Region, Canadian National Railway
17641 Ashland Avenue
Homewood, Illinois 60430

Subject: §401 Water Quality Certification **NRS05.186**

Dear Mr. Scola:

We have reviewed your application for the proposed fill at the Hatchie River crossing at Rialto, Tennessee. Pursuant to §401 of the Federal Clean Water Act (33 U.S.C. 1341), the state of Tennessee is required to certify whether the activity described below will violate applicable water quality standards.

Subject to conformance with accepted plans, specifications and other information submitted in support of the application, the state of Tennessee hereby issues certification for the proposed activity (enclosed). Failure to comply with the terms of this permit or other violations of *The Tennessee Water Control Act of 1977* is subject to penalty in accordance with T.C.A. §69-3-115.

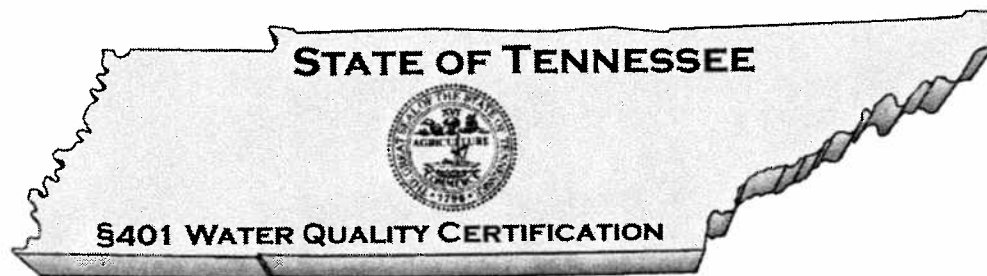
It is the responsibility of the permittee to ensure that all contractors involved with this project have read and understood the permit conditions before the project begins. If you need any additional information or clarification, please contact me at 615-532-0710 or by e-mail at Robert.D.Baker@state.tn.us.

Sincerely,

A handwritten signature in cursive script, reading "Robert Baker", is positioned above the typed name.

Robert Baker
Natural Resources Section

Cc: Memphis, Jackson Environmental Field Offices
U.S. Army Corps of Engineers, Memphis District
Lee Barclay, U.S. Fish and Wildlife Service, Cookeville, TN
Rob Todd, Tenn. Wildlife Resources Agency, Nashville, TN
Tom Welborn, U.S. Environmental Protection Agency, Atlanta, GA
File copy



NRS05.186

Pursuant to §401 of the Federal Clean Water Act (33 U.S.C. 1341), the state of Tennessee is required to certify whether the activity described below will violate applicable water quality standards. Accordingly, the Division of Water Pollution Control requires reasonable assurance that the activity will not violate provisions of The Tennessee Water Quality Control Act of 1977 (T.C.A. § 69-3-101 et seq.) or of § 301, 302, 303, 306 or 307 of The Clean Water Act.

Subject to conformance with accepted plans, specifications and other information submitted in support of the application, pursuant to 33 U.S.C. 1341, the state of Tennessee hereby certifies the activity described below. This shall serve as authorization pursuant to §T.C.A. 69-3-101 et seq.

PERMITEE: Canadian National Railway
17641 Ashland Avenue
Homewood, Illinois 60430

AUTHORIZED WORK: The authorized work consists of replacement of timber railroad trestle with rock fill material. The fill will be in three segments totaling approximately 990 linear feet. The height of fill material will vary between 10 and 15 feet with 1.7:1 side slopes, a maximum base width of 65 feet and within an area totaling 1.73 acres. The fill material will consist of crushed stone aggregate. The project site is located under the railroad and within the right of way. The purpose of the work is to repair deficient trestle structures for safe rail operations.

LOCATION: Hatchie River and adjacent wetlands near Rialto in Lauderdale County; 35.6293°N, 89.6048°W

EFFECTIVE DATE: July 6, 2007

EXPIRATION DATE: October 31, 2010

SPECIAL CONDITIONS:

1. The wetland fill shall be compensated through purchase of mitigation credits at a 4:1 ratio at the Sunk Lake mitigation site in Lauderdale County.

GENERAL CONDITIONS:

2. The work shall be accomplished in conformance with the accepted plans, specifications, data and other information submitted in support of the above application and the limitations, requirements and conditions set forth herein.

3. Impacts to waters of the state other than those specifically addressed in the plans and this permit are prohibited. All streams, springs and wetlands shall be fully protected prior, during and after construction until the area is stabilized. Any questions, problems or concerns that arise regarding any stream, spring or wetland either before or during construction, shall be addressed to the Division of Water Pollution Control, Jackson Environmental Field Office, 731-512-1300.
4. All work shall be carried out in such a manner as will prevent violations of water quality criteria as stated in Rule 1200-4-3.-03 of the Rules of The Tennessee Department of Environment and Conservation. This includes but is not limited to the prevention of any discharge that causes a condition in which visible solids, bottom deposits, or turbidity impairs the usefulness of waters of the state for any of the uses designated by Rule 1200-4-4. These uses include fish and aquatic life, livestock watering and wildlife, recreation, irrigation, industrial water supply, domestic water supply and navigation.
5. Appropriate steps shall be taken to ensure that petroleum products or other chemical pollutants are prevented from entering waters of the state. All spills must be reported to the appropriate emergency management agency, and measures shall be taken immediately to prevent the pollution of waters of the state, including groundwater.
6. Adverse impact to formally listed state or federal threatened or endangered species or their critical habitat is prohibited.
7. This permit does not authorize impacts to cultural, historical or archeological features or sites.
8. It is the responsibility of the applicant to convey all terms and conditions of this permit to all contractors. A copy of this permit, accepted plans, and any other documents pertinent to the activities authorized by this permit shall be maintained on site at all times during periods of construction activity.

This does not preclude requirements of other federal, state or local laws. In particular, work shall not commence until the applicant has received the federal §404 permit from the U. S. Army Corps of Engineers, a §26a permit from the Tennessee Valley Authority or authorization under a Tennessee NPDES Storm Water Construction Permit where necessary. This permit may also serve as a federal §401 water quality certification (pursuant to 40 C.F.R. §121.2) since the planned activity was reviewed and the division has reasonable assurance that the activity will be conducted in a manner that will not violate applicable water quality standards (T.C.A. § 69-3-101 et seq. or of § § 301, 302, 303, 306 or 307 of The Clean Water Act).

The state of Tennessee may modify, suspend or revoke this permit or seek modification or revocation should the state determine that the activity results in more than an insignificant violation of applicable water quality criteria or violation of the act. Failure to comply with permit terms may result in penalty in accordance with T.C.A. §69-3-115.

An appeal of this action may be made to the Water Quality Control Board. In order to appeal, a petition requesting a hearing before the Board must be filed within 30 days after receipt of the permit. In such petition, each contention should be stated in numbered paragraphs that describe how the proposed activity would be lawful and the action of the state is inappropriate. The petition must be prepared on 8½" x 11" paper, addressed to the Water Quality Control Board and filed in duplicate at the following address: Paul E. Davis, Director, Division of Water Pollution Control, 6th Floor L & C Annex, 401 Church Street, Nashville, Tennessee 37243-1534. Any hearing would be in accordance with Tennessee Code Annotated Section 69-3-110 and 4-5-301 et seq.

A handwritten signature in cursive script, appearing to read "Paul E. Davis", written in dark ink.

Paul E. Davis, P.E.
Director, Division of Water Pollution Control



**Notice of Determination
Aquatic Resource Alteration Permit
Canadian National Railway -- Hatchie River Crossing
Rialto, Tennessee**

This notice sets out the final determination of the Tennessee Department of Environment and Conservation, Division of Water Pollution Control, on the §401 water quality certification requested by the Canadian National Railway to place fill in wetlands associated with rehabilitation of its rail crossing. The certification request is pursuant to *The Federal Water Pollution Control Act of 1972* and *The Tennessee Water Quality Control Act of 1977*.

Background

The Canadian National Railway presently owns a rail crossing of the Hatchie River at Rialto in Lauderdale County. The 65-year old structure extends approximately 3,665 feet across the channels and associated floodplain of the Hatchie River. The floodplain portions of the crossing are supported by upright timber trestle driven into the ground. The timbers support an elevated rail-bed which crosses the river channels via spans.

At present, the elevated rail crossing is becoming dilapidated and unsafe, making rehabilitation imperative. Only two solutions exist. One is to replace the timber trestles with concrete piers; the other is to place rock fill material underneath the elevated trestles for support.

The division has issued §401 water quality certification dated July 6, 2007, for the rock fill alternative. The permitted alternative consists of replacement of timber railroad trestle (single track) with rock fill material in three segments. The length of the proposed rock fill is approximately 990 linear feet and the height of fill material varies between 10 and 15 feet. It will have 1.7:1 side slopes, a maximum base width of 65 feet and be built within an area totaling 1.73 acres. The fill material would consist of crushed stone aggregate. The project site is located under the railroad and within the right of way. The right of way is cleared of vegetation and is maintained with herbicide.

The project also includes existing fill that was placed under the rail in 1996. That fill is 793 feet long and was permitted by the division in 1996 under emergency circumstances. Compensation for this fill was not completed. Approximately 1.38 acres of wetlands were impacted during that emergency fill. The wetland acres filled in 1996 added to the proposed fill totals 3.11 acres.

The project includes compensatory mitigation through the purchase of credits in the Sunk Lake mitigation site in Lauderdale County at a 4:1 ratio to compensate for the total fill.

Antidegradation

Anti-degradation regulations prohibit degradation in waters identified by the Department as Tier II high quality unless and until it is affirmatively demonstrated to the Department, after full satisfaction of intergovernmental and public participation provisions, that a change is justified as a result of necessary economic or social development and will not interfere with or become injurious to any classified uses existing in such waters.

The Hatchie River is identified as high quality (tier 2) waters from an upstream point at the Mississippi state line downstream to its confluence with the Mississippi River. The basis for inclusion of the Hatchie River as high quality includes the following: it is designated as a Class I Natural River Area under *The Tennessee Scenic Rivers Act*; it flows through the Hatchie National Wildlife Refuge and Lower Hatchie National Wildlife Refuge; is the last major un-channelized river in West Tennessee and is habitat for the state threatened Blue Sucker (*Cyprinostomus elongatus*).

The department has identified the floodplain wetlands immediately adjacent to the Hatchie River at the railway crossing as high quality tier 2. The drainage area in the segment in the watershed of the Hatchie River at the railway crossing is 2,308 square miles. The floodplain is relatively narrow and contained; it is characterized by frequently inundated wetlands resulting from out of bank flooding of relatively long duration.

Public Notice and Participation

Anti-degradation regulations require the department to hold a public meeting when an applicant proposes to seek a permit to degrade high quality tier 2 waters. That public meeting was held near the project site in Covington on February 21, 2006.

These rules require that if the department determines that degradation is justified, it will notify the applicant, the federal and state intergovernmental coordination agencies, and third persons who requested notification of the determination. In this case the department determined that the degradation of these wetlands was justified (see comment # 4). This determination was announced in a public notice on June 7, 2006. A second public hearing on the permit proposal was held on February 1, 2007, also in Covington.

Concerns Identified

Both written and oral comments were received by the department during the public participation period. The department identified its own technical concerns regarding the proposal as well.

Most of the concerns and comments regard the change in the way floodwaters flow under the railroad. Most of the impacts, both direct and indirect, are therefore associated with the change in flooding patterns. Presently, although some of the floodplain is already filled at the crossing, floodwaters can pass under the railroad through the timber trestles. The proposal will constrict the floodplain with fill material, or in other words, block off

the open area under the rail, causing the flood flows to go around the fill in a narrower pathway.

The following are the comments and concerns that were identified during the public participation process. Only comments that regarded substantive water quality issues are mentioned and addressed.

Comment # 1: *The fill material will act like a dam by constricting the floodplain and may worsen flooding of cropland lying upstream of the railroad crossing.*

The applicant performed two different hydraulic models to help predict how flood flows would be changed by the fill. In 1999, the applicant submitted a hydraulic/hydrologic report¹ that indicated that the fill would cause less than 0.2 foot rise in flood height during the one-hundred year flood. In 2005, an additional simulation model was developed by the applicant to represent two-dimensional hydraulics². That model showed less than 0.1 foot rise in flood height. This is in part due to the backwater affect of downstream fill at U. S. Highway 51 (US-51). Also, a significant proportion of the floodplain will remain unblocked after the project.

The railroad crossing is approximately one mile upstream of the US-51 crossing of the Hatchie River. In 1974 and 1975, US-51 was modernized to a two lane, divided highway with the addition of a causeway fill for a southbound lane. The construction of the southbound bridge reduced the effective flow width of the channel from about 4,000 feet to about 1,000 feet. Backwater from the highway extends up to and through the railroad crossing. Therefore, we conclude that the activity will not worsen flooding.

Comment # 2: *A common concern is that the fill would constrict the floodplain which would increase flood velocities and cause worsened erosion of both the Hatchie River channel and private property nearby.*

An increase in current velocity is predicted by the applicant's hydraulic modeling. It shows a maximum increase in velocity of about 0.7 feet per second (fps) in the main channel. There are two additional openings that exist between the railroad fill. One of these openings, referred to as the secondary outlet, will be divided in-two by the fill. The model predicts velocity increases in the secondary channel to be about 1 to 1.5 fps. The predicted velocity increase in the floodplain channel would be about 1.5 fps as well.

The increases in velocity are shown to be localized to the area of channel adjacent to the fill and within a few hundred feet downstream. We do not believe that the velocity increases are significant or widespread; we therefore expect no significant erosion. Further, unlike most rivers in the coastal plain area of Tennessee, the Hatchie River is not channelized. Because it is not channelized, the Hatchie River is a more stable system

¹ Michael A. Collins, "Hydraulic/Hydrologic Evaluation – Illinois Central Railroad Hatchie River Bridge Modifications – Rialto, Tennessee" (July 25, 1999).

² AMEC Earth and Environmental, Inc., "Hydraulic and Scour Analysis of a Two Mile Reach of Hatchie River" (March 2005).

than the channelized rivers. We expect that any channel erosion that may occur will remain relatively localized.

Comment # 3: *Incremental watershed modifications, each having a small negative impact on the natural physical and biological function of river channels and floodplains, eventually lead to severe systemic negative consequences because of cumulative effects.*

We agree that watershed degradation usually occurs not because of any single waterway alteration, but, rather innumerable small alterations, many of which may have no predicted significant effect when considered individually. However, we do not believe that this project will have unacceptable cumulative consequences to the resource.

In considering cumulative impact, we looked at whether the Hatchie River is especially vulnerable to incremental effects. Because it has not been channelized, we consider the Hatchie to be more stable than most other altered rivers and therefore relatively less vulnerable to incremental affects.

We also looked at whether this action is one of many similar actions in the same geographic area. The US-51 crossing is about one mile downstream. This crossing profoundly affects hydrology of the Hatchie River³. In fact, the hydraulic affects of the US-51 crossing over-shadow the proposed fill at the railroad. Further, the future Interstate 69 must cross the Hatchie River somewhere nearby. These other similar actions all have similar impacts to the resource. The affects of this crossing must be considered in context with the other two linear transportation projects.

Finally, we considered whether the similar impacts have been historically significant to the resource. As stated above, the US-51 fill has caused profound change to the hydraulics of flood flows in the Hatchie River bottoms. However, we do not know whether the US-51 has caused impacts that extend beyond the direct impact area. We do not believe that this fill will cause historically significant change to the resource.

We do not believe that the Hatchie River is especially vulnerable to incremental effects. However, there are other similar actions in the same geographic area that have similar impacts. In this case, the fill from the downstream US-51 causes backwater during flooding that extends upstream and past the railroad fill. This significantly diminishes the incremental effects on hydraulics/hydrology that the railroad fill will have in conjunction with the other two transportation crossings.

Comment # 4: *The Hatchie River is designated as high quality tier 2 under the Tennessee Antidegradation Statement. Anti-degradation regulations prohibit degradation in waters identified by the department as Tier II high quality unless the degradation is socially and economically justified.*

The proposed stabilization improvements to the crossing consist of placing crushed stone fill along and under selected segments of the trestle. The proposed activity will be

³ U. S. Geological Survey, Open-File Report 89-598, "Channel Evolution of the Hatchie River Near the U. S. Highway 51 Crossing in Lauderdale and Tipton Counties, West Tennessee" (1989).

completed by use of a rail car equipped with a tipping bucket and a mounted crane that will place and shape the aggregate fill material under the rail trestle. The proposed fill placement can be completed in a period of a few months without interruption to current train schedules. Further stabilization or reconstruction of filled sections would not be required.

The applicant estimates that the proposed placement of fill along 990 feet of trestle will cost approximately \$1,300 per foot, or approximately \$1.3 million.

Reconstruction of sections of the crossing structure with concrete and steel pilings is more labor intensive than placing fill and requires a ground crew and large construction vehicles to complete the task. There is no road access to the river bottom adjacent to the trestle. The logistics of this alternative are compounded in the absence of road access to the trestle sections to be stabilized. Because of the extended length of sections requiring stabilization, the absence of road access, and the seasonally unfavorable construction conditions, executing this alternative is expected to require several years to complete. Canadian National Railway reports that track slow orders would be required during the entire extended construction period, adding to the total costs of the project.

Mobilization, materials and operations expenses for structure replacement are estimated by the applicant to be \$6.5 million. Continuing maintenance costs for this alternative also would be expected because of the eventual deterioration of the concrete and steel structure.

In June of 2006, the division issued a Notice of Determination of Economic/Social Necessity for this project. The notice announced that the division had determined that the change is justified as a result of necessary economic or social development and will not interfere with or become injurious to any classified uses existing in the affected waters. This determination was based upon the division's consideration that the cost of the alternative is significantly greater than that associated with the preferred action and that the alternative does not provide sufficiently greater environmental benefit to justify the additional cost.

Comment # 5: *The Hatchie River is designated as a Class I Natural River Area under The Tennessee Scenic Rivers Act of 1968. The work is inconsistent with the provisions of the Scenic Rivers Act.*

The Hatchie River provides outstanding scenic, recreational, geological, fish and wildlife, and other scientific and cultural values to the people of Tennessee. Primary objectives of the Scenic Rivers Act are to preserve natural stream flow and natural ecological conditions; to preserve a true natural environment with sections of rivers with shorelines and scenic vistas unchanged, or essentially unchanged, by man.

Either of the two available alternatives has associated negative impacts to scenic river act considerations. Vegetation is absent within the right of way in either scenario. Natural stream flow is better sustained with the concrete pilings scenario. However, the rock fill presents a more natural material than the concrete (although rock is not natural to the coastal plain area).

The rock fill will produce no direct lateral damage to the adjacent wetlands. Construction of concrete pilings would cause direct impact to the adjacent wetlands. Environmental consequences related to construction of the concrete pilings include the repeated mobilizations of equipment and material in the wetlands during construction, disturbance of wetland soils under the trestle by removal of the upper portions of the timber piers and installation of replacement piers, enlargement of the construction footprint for equipment and material storage and staging, and continued maintenance of the replacement structures.


In consideration of the above, we conclude that the rock fill is the more acceptable alternative as regards scenic river considerations.

Comment # 6: *The Hatchie River at this location is known habitat for the state threatened Blue Sucker (Cycleptus elongatus) and two species of mussels, Southern Hickorynut (Obovaria jacksoniana) and Southern Rainbow (Villosa vibex) that are not listed but are considered globally rare.*


We do not believe that there will be substantial change to the riverine habitat of the Hatchie River as a result of this project; therefore, there should be no threat to the continued existence of these rare species.

Therefore, the division's determination is that a §401 certification can be issued in accordance the applicable provisions of the Clean Water Act and the Tennessee Water Quality Control Act.

Prepared by:


Robert Baker
Natural Resources Section

7, 6, 07
Date


Paul E. Davis, P. E.
Director, Division of Water Pollution Control

7, 6, 07
Date



NOTICE OF DETERMINATION

APPLICATION FOR AQUATIC RESOURCE ALTERATION PERMIT

CITY OF FRANKLIN, INCREASED WATER WITHDRAWAL FROM THE HARPEATH RIVER

NOVEMBER 2007

Proposed Action

The City of Franklin in Williamson County has applied for an Aquatic Resource Alteration Permit (ARAP) under *The Tennessee Water Quality Control Act of 1977* to increase its withdrawal of water from the Harpeth River. This notice sets out the final determination of the Tennessee Department of Environment and Conservation, Division of Water Pollution Control, on that proposal.

The City of Franklin presently withdraws water from behind a low-head dam on the Harpeth River at a point in the river near the intersection of Carriage Park Drive and Lewisburg Pike. That water is used to fill an off-stream reservoir from which it is pumped to the treatment plant when needed. The proposal involves modification to the rate and volume of water withdrawn from the Harpeth River.

The present maximum rate of withdrawal is 11.1 cubic feet per second (cfs). The proposal includes an increase in the pump capacity to 17.4 cfs and would increase the present water treatment plant capacity from 2.1 million gallons per day (mgd) to 4.15 mgd. The city has also proposed that water would be withdrawn or pumped at a rate of no more than 20% of the flow in the river and the withdrawal would cease when the flow in the river is at or below 5 cfs. Prior to this application, the department had not yet established any specific limits or conditions on this withdrawal.

Background

The city currently owns and operates a water treatment plant (WTP) with a capacity of 2.1 mgd. The raw water is withdrawn from the Harpeth River within the southern city limits and stored in an open earthen reservoir (110 million gallon design capacity as initially constructed) for later treatment. The city purchases the balance of its water from the Harpeth Valley Utility District. In 2005, the city saw an average daily demand of 6 mgd and a peak demand of 9.3 mgd in the water distribution system. The city is

evaluating alternatives to address present and future water demands and to comply with newly promulgated federal water regulations, including WTP expansion.

The original WTP was constructed in 1952 and was expanded and upgraded in 1968 and again in 1994. Because the WTP was constructed prior to the TDEC Aquatic Resource Alteration Permit rule promulgation, the withdrawal was not regulated under ARAP. However, to increase the withdrawal to the existing WTP facilities, an ARAP is now required.

A public notice that announced the application for a permit for the project was published on January 31, 2007. A public hearing was requested in response to the notice. The department held a hearing in Franklin on the evening of March 8, 2007. Comments were received from agencies and the public throughout this process. The comments are addressed in this document.

Comments

- The increased withdrawal would reduce the amount of wetted streambed habitat during low flows, which would be harmful to fish and aquatic life.
- The increased withdrawal would remove water needed for assimilation of downstream wastewater discharges from sewage treatment plants. This would further degrade water quality, particularly dissolved oxygen.
- The City of Franklin presently purchases a significant proportion of their drinking water from the Harpeth Valley Utility District . The construction of a new water treatment plant together with increasing the withdrawal from the river is not justified economically. A better alternative is to purchase all of the water needed by the city from the HVUD.
- The increased withdrawal would reduce the amount of water necessary to allow or sustain recreational uses such as canoeing.
- Regardless of whether or not a permit is issued, the dam behind which the intake is located should be removed. This would improve water quality and be beneficial to fish and aquatic life by eliminating the barrier to the movement of aquatic life.
- Right now the city takes water out of the river with no limitations other than voluntary restrictions. Some restriction should be placed on all interim or post permit withdrawals.
- The data from United States Geological Survey (USGS) gage at highway 96 is influenced by the existing withdrawal just upstream from the gage. Therefore, if a permit is issued, the city should not rely on that gage to determine stream flows on which to base their withdrawal.
- The Harpeth River is listed as impaired. Additional degradation cannot be allowed.
- The raw water reservoir leaks which causes the withdrawal to be less efficient. This in turn necessitates the withdrawal of more water than would otherwise be necessary. The raw water reservoir should be repaired.

Final Action

The division has determined that the proposed withdrawal rate at 20% of the flow in the river will not result in an impairment of the uses designated to the Harpeth River when it is coupled with an additional requirement that the withdrawal will not cause the flow to fall below 10 cfs. The division has issued a permit, dated November 28, 2007 that authorizes the withdrawal under these conditions.

Antidegradation - Alternatives Analysis

Rule 1200-4-3.06¹ contains Tennessee's Antidegradation Statement. It requires that applicants submit alternatives analysis as part of the application process. It also states that new or additional degradation will be allowed only if the applicant has demonstrated to the department that reasonable alternatives to degradation are not feasible. Analysis of reasonable alternatives includes a discussion of the feasibility of all potential alternatives, plus the social and economic considerations and environmental consequences of each. The alternatives that were considered by the city all involved purchasing some or all of its water from the HVUD. Except for the scenario in which all of its water would be purchased, the remaining alternatives included pumping water from the river at some percentage of the total flow. Alternatives that included a low flow below which no pumping would occur were also examined.

The different alternatives included:

1. No cut-off, 10% of flow withdrawn
2. No cut-off, 15% of flow withdrawn
3. No cut-off, 20% of flow withdrawn
4. 3 cfs cut-off, 15% to 30% of flow withdrawn
5. 5 cfs cut-off, 20% of flow withdrawn – this is the city's suggested alternative
6. 10 cfs cut-off, 20% of flow withdrawn – this is the authorized alternative

In conducting the antidegradation review, the department compared the anticipated impacts of purchasing all of its water from HVUD (no withdrawal alternative) and alternatives 5 and 6, which are considered the least degrading of the alternatives listed above. The department, with input from the Tennessee Wildlife Resources Agency, reviewed data provided by the city and determined, based on reasons explained in more detail below, Alternative 6 would result in less degradation than the Harpeth River currently experiences and would not impair the river's uses. Therefore the department has determined that neither alternative 6 nor purchasing all of the water from HVUD would cause new or additional degradation.

Social and Economic Considerations

The department reviewed the economic information provided by both the city and Dr. William Wade to compare the economic aspects of purchasing all of the water from HVUD with alternative 6. The department conducted this evaluation to determine if

¹ This citation refers to the rules applicable at the time of application.

either of the alternatives provides a significantly greater economic and/or social benefit to the community. The information reviewed is listed below.

1. Harpeth River Water Availability Study For Consideration of Modified Withdrawal For Treatment And Distribution at The City of Franklin WTP, CTE Draft Technical Memorandum, June 9, 2006
2. Comments On "Franklin Water Treatment Plant CTE Economic Analysis Revisited, By William W. Wade For HRWA," CTE, September 19, 2006
3. Economic Criteria For Regional Water Supply Planning In Tennessee: Lessons Learned From Harpeth River ARAP, Presentation to TN AWRA, William W. Wade, Ph. D., Energy And Water Economics, April 18, 2007
4. The City of Franklin ARAP Application For Water Withdrawal, Presentation to TN AWRA, Scott Woodard, CTE, April 18, 2007.
5. Personal Correspondence From William W. Wade to Paul Davis, Robby Baker, Dorie Bolze and Pam Davee, October 25, 2007.

Based on our review, we do not believe that either of these 2 alternatives provides a significant economic advantage over the other. The city asserts there will be some cost savings and that a redundant/back-up source will provide a measure of security in its water supply. We believe that alternative 6 will result in no new or additional degradation, is economically equivalent to or perhaps as the city asserts, somewhat less expensive than the no-withdrawal alternative, and it provides the city with the benefit of having a redundant/back-up water source. Therefore, after consideration of the environmental consequences of the alternatives and the social and economic basis for the proposed activity, the department finds that authorization of the 10 cfs cut-off, 20% of flow withdrawn, alternative is justified.

Fish and Aquatic Life

Data collected for the applicant² and previous fish and aquatic life surveys done by the TWRA indicate that the stream presently supports a poor to fair fish population. The department has previously determined that this segment of the Harpeth River does not currently support the designated use of fish and aquatic life. Sedimentation and low dissolved oxygen levels in the water during the summer are listed as the causes.

The small scale darter, *Etheostoma microlepidum*, is among the fishes found during that survey. This is a species listed as deemed in need of management by the department. Other darter species along with sunfishes and minnows are present.

The watershed of the Harpeth River above the intake is approximately 191 square miles. During winter and spring the watershed usually yields plenty of flow. However, the seasonal climate and geology in the watershed results in very low summer and fall flows. Maintaining the full range of natural variation of flow regimes is critical to sustaining native biodiversity and integrity in aquatic ecosystems. However, the low flows are of

² Pennington and Associates, Inc. Fish and Macro-invertebrate Surveys Harpeth River, City of Franklin Williamson County, Tennessee

most concern here because of the significant consequence to available habitat that may result from a relatively small reduction in flow. When the stream bed, particularly the riffle area, is only marginally wetted a reduction in flow can result in a significant reduction in the amount of riffle that remains wet and remains as available habitat for aquatic life.

Riffles are some of the most biologically productive areas of a stream. Organisms that live in the riffles make up the bulk of the individuals and species inhabiting a stream or river. Also, the turbulence of the water through the riffles helps to re-aerate the water, adding dissolved oxygen. Therefore, maintaining flow in the riffles is critical to the protection of the primary ecological component of the river and also the greater diversity of the fish and aquatic life.

We considered the city's proposal to cease its withdrawal when the flow gets down to 5 cfs. Using flow data taken at the Highway 96 bridge downstream of the withdrawal, the city simulated several withdrawal scenarios, including ceasing withdrawal when the flow drops to 5 cfs and ceasing at 10 cfs.

We reviewed the data from the flow simulation model and the information and data regarding wetted width. The department consulted with TWRA regarding the habitat and flow needs of the fish and aquatic life. We concluded that it is necessary to conserve flows at 10 cfs or below to be protective of the fish and aquatic life use. We consider the 10 cfs cutoff to be the lowest flow that insures inundation of the riffles in this river reach at sufficient depths and velocities to preserve ecological functions, and that allowing withdrawal of 20% of available flow above that cut off would follow the natural hydrograph and not impair the multiple uses of the Harpeth River.

Recreation

Canoeing and other recreational uses have varied and uncertain flow needs. The Harpeth is marginally suitable for canoeing at flows in the range of 20 cfs and most paddlers would only canoe when flows are well above that. We determined that canoeing was likely to occur at flows above 20 cfs at the highway 96 gauge. When flows are in the range that is normally used for canoeing, the amount of the withdrawal should not interrupt that use. For other recreational uses such as wading or swimming, we didn't determine a lower cut-off, but we do not believe that there will be any loss of use for wading or swimming caused by the withdrawal. We have determined that the permit as we have conditioned it is broadly protective of the recreational uses of the river.

Assimilative Capacity

In order to evaluate the potential impact of the withdrawal on the assimilative capacity we used river flows recorded at the gauging station located between the intake and the wastewater discharge point, historical withdrawal data, upstream carbonaceous biochemical oxygen demand (CBOD) data from Franklin's stream monitoring program, Franklin's current effluent CBOD limit (6 mg/l) and the effluent CBOD limit (4 mg/l) recommended for Franklin in the Total Maximum Daily Load (TMDL) done by EPA .

Using those inputs, we were able to predict the relationship between withdrawal rates, waste water treatment plant effluent CBOD concentration and the resultant CBOD concentration in the river at worst case flows. This can be assumed to approximate the potential change in assimilative capacity.

We considered 4 different scenarios (all of which assumed Franklin at its full design capacity of 12 MGD):

1. Franklin at 12 MGD, 6 mg/l CBOD and the proposed withdrawal plan.
2. Franklin at 12 MGD, 6 mg/l CBOD and no withdrawal (neither current nor proposed).
3. Franklin at 12 MGD, 4 mg/l CBOD and the proposed withdrawal plan.
4. Franklin at 12 MGD, 4 mg/l CBOD and no withdrawal (neither current nor proposed).

The proposed withdrawal plan with the 5 cfs cutoff, when compared with no withdrawal, results in an increase in downstream CBOD of approximately 6 % for an effluent CBOD concentration of 6 mg/l and 5 % for an effluent CBOD concentration of 4 mg/l. At normal or higher flows, the difference would be less than this.

Our decision to increase the cutoff limit to 10 cfs would be more protective of dissolved oxygen concentrations in the Harpeth River. The department has determined that the withdrawal as permitted would not significantly affect instream assimilative capacity or worsen the dissolved oxygen characteristics.

Existing Dam

In principle, removal of the dam will benefit water quality by reducing stagnation and benefit stream ecology by eliminating the barrier to upstream and downstream movement of aquatic life.

The process of removing a dam, though, should not be over-simplified. Over the years, several feet of sediment has been deposited throughout the reach that is impounded behind the dam. That sediment would have to be excavated before the dam is removed. Otherwise, when the dam is removed, all of the sediment that is there would be flushed downstream. Before removing the sediment, however, we must know how much sediment there is and whether or not it is contaminated so that it can be properly handled and disposed.

We are requiring the city to investigate the feasibility of removing the dam. The purpose of the feasibility study is to evaluate the costs and benefits associated with the restoration of water quality and fisheries ecosystem in the Harpeth River. The feasibility study is to be coordinated through the department and allow stakeholder participation.

Existing Withdrawal

At present the city takes water out of the river with no limitations other than voluntary restrictions. As of this action, the city now holds a permit to withdraw water from the Harpeth River. The issued permit explicitly prohibits withdrawal of water when the flow

is below 10 cfs. Our position is that this permit condition governs withdrawal from this point forward, whether or not the city expands pumping capacity.

Existing Raw Water Reservoir

Production of treated water is managed according to volume or levels of raw water in the reservoir. The raw water reservoir was initially designed and constructed for 110 million gallon capacity. However, based on more recent surveys of the reservoir the reported maximum capacity of the reservoir is 95 million gallons. The total raw water storage volume is reportedly being evaluated under a separate study. Also, the reservoir is reported to lose water because of leakage. Our understanding is that the city has repaired some of the leakage while the reservoir has been drawn down during the recent drought.

An increase in raw water storage could impact and improve the number of days per year that water can be produced and result in more efficient harvesting of water from the river. However, whether or not the city repairs the leakage or restores the capacity, we do not perceive additional protection of the river when considering the protective measures of the permit.

Highway 96 USGS flow gage

The USGS flow gage at highway 96 is downstream of the existing or proposed intake, and is therefore influenced by any withdrawal. For that reason, we have conditioned the permit to require the city to develop plans for a flow measurement system that will compensate for the water withdrawal. This may include working with the USGS to calibrate flow at the intake with the existing highway 96 gage by updating all relevant data. Other options may include funding an additional USGS gage or construction of an intake weir that physically by-passes the base flow of 10 cfs.

Prepared by

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